

Machine Learning - Course Outline

COMP 421: 2013 Trimester 1

This document sets out the workload and assessment requirements for COMP 421. It also provides contact information for staff involved in the course. If the contents of this document are altered during the course, you will be advised of the change by an announcement in lectures and/or on the course web site. A printed copy of this document is held in the School Office.

The course

This course looks at contemporary ideas and algorithms in 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 perhaps make those decisions themselves. Classic machine learning applications tend to be in robotic control, handwriting and speech recognition, spam filtering, DNA sequence classification, computer vision and so on. The course teaches the essential ideas of machine learning and makes reference to many of these application areas, but also looks at the larger question of how machines might become truly autonomous agents - what would it take, and how might we go about engineering them? The course makes much use of, and teaches, fundamental ideas in probability theory: prior knowledge of these is useful but not essential. It is primarily a lecture-based course, and ranges over a variety of topics based around adaptive behaviour, inference and information, learning to represent the world, and learning appropriate actions from reinforcement.

Preparation and expectations

COMP307 is a prerequisite for this course, but if you have other relevant background it can be waived: see Marcus if you don't have 307 but want to take the course. Simple "starter" code in `python` will be distributed for some of the algorithms, and so previous familiarity with python (or Matlab / Octave) might be helpful, but is by no means essential. The programs are generally simple in structure, and students are welcome to use any programming language they like to complete the assignments.

Objectives

A pass in this course indicates that a student has:

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

Textbook

There is no *required* textbook for this course, but several are *recommended* and some are even *free*. See [Texts](#).

Lectures, Tutorials, Laboratories, and Practical work

The main contact teaching style for this course is lectures accompanied by handouts of the slides. Some handouts may contain detail, others may be just summary figures.

The [schedule](#) of lecture topics, readings, and assignment due dates is available online. Lectures for COMP 421 are (provided this agrees with the [university timetable](#))

<u>day</u>	<u>time</u>	<u>room</u>
Monday	4pm	Cotton 118
Wednesday	4pm	Cotton 118
Friday	4pm (oh YEAH!)	Cotton 118

All lectures are the standard 50 minutes.

There are no tutorials scheduled but I am happy to do this on an ad hoc basis, if students let me know in advance (e.g. through your class representative or in person).

It is up to students to take down the notes they need as we work through material (whether on slides or on the board).

and to go over these later to re-work the material in their own way. The most wholesome study record is the one you write, for yourself, built up by reflecting on the lecture material.

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: 5
- Assignments: 3 (averaged)

School of Engineering and Computer Science

The School office is located on level three of the Cotton Building (Cotton 358). We share this with the School of Maths, Stats and Operations Research (MSOR).

Staff

The course organiser and lecturer for COMP 421 is Marcus Frean:

- Cotton 227
- +64 4 463 5672
- Marcus.Frean@ecs.vuw.ac.nz
- Office hours: 9-11am on Fridays, or by appointment.

Announcements and Communication

Communication outside of lecture will be via email and the COMP 421 web area at http://ecs.victoria.ac.nz/Courses/COMP421_2013T1/.

Assessment

Your grade for COMP 421 will be determined based on the following assessment weightings:

<u>item</u>	<u>weighting</u>
Assignments	40%
Final Examination	60%

There will be four assignments, each worth the same amount, with details provided on the Assignments page. The assignments will delve further into the material covered in lectures with the goal of enhancing your understanding of that material.

Due dates for assignments are given below.

Exam

The exam will be similar in form and content to previous exams, apart from the inevitable changes of emphasis and material that have occurred as the course has developed over time.

The [\[\[http://www.victoria.ac.nz/timetables/exam-timetable.aspx\]\[timetable for final examinations\]\]](http://www.victoria.ac.nz/timetables/exam-timetable.aspx) will be available from the University web site and will be posted on a notice board outside the faculty office. The final examination will be three hours long. No computers, electronic calculators or similar devices will be allowed in the final examination. Paper non-English to English dictionaries will be permitted. The study and examination period for trimester 1 is 14 June - 3 July.

Assignments and practical work

There will be 4 assignments. Further details of assignments will appear on the assignments page as the course progresses. Dates will be as follows:

	<u>likely topic</u>	<u>handed out</u>	<u>due in</u>
<u>Assignment 1</u>	based on the "basics" stuff	Friday 15th March	Friday 5th April
<u>Assignment 2</u>	based on the supervised/unsupervised learning stuff	Friday 5th April	Friday 19 April
<u>Assignment 3</u>	based on belief nets	Monday 29th April	Monday 13th May
<u>Assignment 4</u>	based on deep learning and/or Bayesian integration(topic models?)	Friday 17th May	Friday 31 May

Policies and penalties for late submission: it's important to get the assignments in on time, so late hand-in will be penalized at 20% per day unless a prior arrangement has been made with the lecturer.

Passing COMP 421

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

Plagiarism

Working Together and Plagiarism

We encourage you to discuss the principles of the course and assignments with other students, to help and seek help with programming details, problems involving the lab machines. However, any work you hand in must be your own work.

The School policy on Plagiarism (claiming other people's work as your own) is available from the course home page. Please read it. We will penalise anyone we find plagiarising, whether from students currently doing the course, or from other sources. Students who knowingly allow other students to copy their work may also be penalised. If you have had help from someone else (other than a tutor), it is always safe to state the help that you got. For example, if you had help from someone else in writing a component of your code, it is not plagiarism as long as you state (eg, as a comment in the code) who helped you in writing the method.

Withdrawal

The last date for withdrawal from COMP 421 with entitlement to a refund of tuition fees is Friday 15 March 2013. The last date for withdrawal without being regarded as having failed the course is Friday 17 May 2013 -- though later withdrawals may be approved by the Dean in special circumstances.

Rules & Policies

Find key dates, explanations of grades and other useful information at <http://www.victoria.ac.nz/home/study>.

Find out about academic progress and restricted enrolment at <http://www.victoria.ac.nz/home/study/academic-progress>.

The University's statutes and policies are available at <http://www.victoria.ac.nz/home/about/policy>, except qualification statutes, which are available via the Calendar webpage at <http://www.victoria.ac.nz/home/study/calendar> (See Section C).

Further information about the University's academic processes can be found on the website of the Assistant Vice-Chancellor (Academic) at <http://www.victoria.ac.nz/home/about/avcacademic>

All students are expected to be familiar with the following regulations and policies, which are available from the school web site:

[Grievances](#)

[Student and Staff Conduct](#)

[Meeting the Needs of Students with Disabilities](#)

[Student Support](#)

[Academic Integrity and Plagiarism](#)

[Dates and Deadlines including Withdrawal dates](#)

[School Laboratory Hours and Rules](#)

[Printing Allocations](#)

[Expectations of Students in ECS courses](#)

The School of Engineering and Computer Science strives to anticipate all problems associated with its courses, laboratories and equipment. We hope you will find that your courses meet your expectations of a quality learning experience.

If you think we have overlooked something or would like to make a suggestion feel free to talk to your course organiser or lecturer.

[Course Outline as PDF](#)