Machine Learning - Course Outline
COMP 421: 2014 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 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, 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, with a nod towards larger questions such as what it means for an artificial agent to represent the world, and whether machines could become truly autonomous agents. 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.

Preparation and expectations

COMP307 is a prerequisite for this course, and in particular the probabilistic inference section of COMP307 as taught in 2013. If you took 307 prior to 2013, please let Marcus know.

Students are welcome to use any programming language they like to complete the assignments. The textbook has companion code in matlab, and some sections will have companion code in python, and so previous familiarity with python (especially numpy) / Matlab / Octave might be helpful, but is not essential.

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 see machine learning problems encountered after the course in the context of current theory and practice.

Textbook

We will be using David Barber's book "Bayesian Reasoning and Machine Learning". See this and other useful books under Texts.

Lectures, Tutorials, Laboratories, and Practical work

The main contact teaching style for this course is lectures. Some lectures will have handouts, but in general it is up to students to take note as needed and to go over these later to re-work the material in their own way. The most useful study record is the one you write, for yourself, built up by reflecting on the lecture material and re-writing it in the light of discussion, the textbook and other sources.

The schedule of lecture topics, readings, and assignment due dates is available online. Lectures will be Tues, Wedn and Fri at 2:10pm in Room 524 of the Old Kirk building, as per the university timetable.

There are no tutorials scheduled but can be arranged on an *ad hoc* basis, if students let Marcus know in advance - the best way might be to do this through your class representative.

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 - some weeks will be bigger than others)

School of Engineering and Computer Science

The School office is located on level three of the Cotton Building (Cotton 358).

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: 9am-noon on Thursdays, 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_2014T1/.

Assessment

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

item	weighting
Assignments	40%
Final Examination	60%

Assignments and practical work

The assignments will delve further into the material covered in lectures with the goal of enhancing your understanding of that material. There will be four assignments, each worth the same amount. Further details will appear on the assignments page as the course progresses. Dates will be as follows, unless changed by agreement with the class (for example if we discover that one of these dates causes stress on other deadlines) :

	handed out	due in
Assignment 1	Friday 14 March	Friday 28 Marchl
Assignment 2	Friday 4th April	Thursday 17 April
Assignment 3	Friday 2nd May	Friday 16th May
Assignment 4	Friday 23rd May	Friday 6th June

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

Exam

The exam will be similar in form and content to previous exams, apart from the inevitable changes of emphasis and material that have occured as the course has developed over time. The exam will be three hours long, and held sometime in the examination period for trimester 1, which is 13 June - 2 July.

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.

If you haven't before, please read the School policy on Plagiarism, as we will penalise anyone we find plagiarising, whether from other students currently doing the course, or from other sources. If you had help from someone else in writing a component of your code or assignment write-up, it is not plagiarism **as long as you state who** helped you in writing that portion.

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.

Withdrawal

The last date for withdrawal from COMP 421 with entitlement to a refund of tuition fees is Friday 14 March 2014. The last date for withdrawal without being regarded as having failed the course is Friday 16 May 2014 -- 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