

Note: Incomplete sections will be updated when information becomes available

MASSEY UNIVERSITY
COLLEGE OF SCIENCES
Paper Outline 2010

Paper Number and Title: 161326 Statistical Machine Learning

Credits value: 15

Semester: 1002

Campus: Manawatu

Mode: Internal

Calendar Prescription:

Introduction to artificial intelligence methods and statistical learning; supervised learning; neural networks; linear methods of regression and classification; Bayesian and kernel classifiers; tree based methods; unsupervised learning; k-means; self-organizing maps; principal components and statistical clustering; optimization and genetic algorithms.

Pre-requisites: One of 161.2xx or (159.2xx and 161.1xx)

Co-requisites:

Restrictions: 159.302

E-Learning Category: Web-based

Paper Coordinator: A/Pro Mark Bebbington

Office: AgHortC 2.09A

Email: M.Bebbington@massey.ac.nz
3569099 ext 2452

Phone:

Secondary Contact: A/Pro Stephen Marsland

Office: AgHortA 3.53

Email: s.r.marsland@massey.ac.nz

Phone: 356 5219

Learning Outcomes:

On successful completion a student will be able to:

1. Write programs to implement statistical learning methods
2. Write programs to implement unsupervised learning
3. Select the appropriate learning technique when required.
4. Understand the basics of model selection and assessment

Alignment of Assessment to Learning outcomes

Assessment Description	Learning Outcomes Assessed					Contribution to Paper Mark
Assessment	1.	2.	3.	4.	5.	
Assignment 1	X		X			20%
Assignment 2	X		X	X		20%
Assignment 3	X	X	X			20%
Test	X	X	X	X		40%

Assessments and Deadlines

Assessment	Due Date / Deadline	Late Penalty	Paper completion requirement
------------	---------------------	--------------	------------------------------

Note: Incomplete sections will be updated when information becomes available

Assignment 1	9am 16 August	Late assignments not accepted	
Assignment 2	9am 27 September	Late assignments not accepted	
Assignment 3	9am 18 October	Late assignments not accepted	
Test	9am Friday 11 November	Late test not accepted	

The turnaround time for assignments will be no more than three weeks from the due date. It is important to note that the specified timeframe applies only to those assignments submitted by the due date, and does not necessarily apply to those submitted late.

Additional Requirements for Paper Completion

Both lecturers welcome enquires from students at any time they can be found in their offices. If you want to arrange an appointment for a specific time, please email.

We will do our best to respond as quickly and fully as possible to any queries using WebCT and direct email. While we will try to monitor the discussion list on WebCT, a direct email to the lecturer(s) will probably elicit a quicker reply. But, please also put questions onto WebCT, so we can answer them there for the benefit of the whole class.

Final examination dates:

http://www.massey.ac.nz/massey/study/exam/timetables/timetables_home.cfm

Timetable:

http://www.massey.ac.nz/massey/study/class-timetable/class-timetable_home.cfm

NO FINAL EXAM

Student Time Budget:

A 15 credit paper equates to 12.5 hours per week, studying 4 papers full time equals 50 hours per week.

Lectures	48
Non-scheduled learning (6 hours/week)	72
Assessment related:	
Assignment (3 at 12 hours)	36
Preparation for test	19.5
Total	187.5

Textbook and Other Recommended Reading, Online Resources:

The prescribed textbook for this course is:

Machine Learning: An Algorithmic Perspective, by Stephen Marsland.

Excerpts will available on WebCT.

The following book contains much the same information, but with a more statistical bias.

Trevor Hastie, Robert Tibshirani and Jerome Friedman. 'The Elements of Statistical Learning',
Springer-Verlag, New York, 2001

Note: Incomplete sections will be updated when information becomes available

Conditions for Aegrotat Pass and Impaired Performance:

If you are prevented by illness, injury or serious crisis from attending an examination (or completing an element of assessment by the due date), or if you consider that your performance has been seriously impaired by such circumstances, you may apply for aegrotat or impaired performance consideration. You must apply on the form available from the Examinations Office, the Student Health Service or the Student Counseling Service.

(c) Aegrotat applications for the final examination for this paper will **not** be considered because there is insufficient supervised assessment to allow the examiners to extrapolate performance in the final examination.

Plagiarism:

Massey University, College of Sciences, has taken a firm stance on plagiarism and any form of cheating. Plagiarism is the copying or paraphrasing of another person's work, whether published or unpublished, without clearly acknowledging it. It includes copying the work of other students. Plagiarism will be penalized; it is likely to lead to loss of marks for that item of assessment and may lead to an automatic failing grade for the paper and/or exclusion from reenrollment at the University.

Grievance Procedures:

A student who claims that he/she has sustained academic disadvantage as a result of the actions of a University staff member should use the University Grievance Procedures. Students, whenever practicable, should in the first instance approach the University staff member concerned. If the grievance is unresolved with the staff member concerned, the student should then contact the College of Sciences office on his/her campus for further information on the procedures, or read the procedures in the University Calendar.

Appendix A

Lecture Outline and Teaching Schedule

Week 1: Course Intro / Statistics Revision (MB)

Week 2: Linear regression, (MB)

Week 3: Introduction to Machine Learning and the perceptron (SM) Week 4: Multilayer Perceptron (SM)

Week 5: Regression(MB)

Week 6: Regression / Model Selection (MB)

Week 7: Model Selection (MB) / Trees (SM)

Week 8: Classifiers / Reinforcement (SM)

Week 9: Linear Discriminant Analysis (MB)

Week 10: Kernel Methods (MB)

Week 11: Unsupervised learning (SM)

Week 12: Genetic Algorithms (SM)