COMP90051 Statistical and Evolutionary Learning

Credit Points:	12.50
Level:	9 (Graduate/Postgraduate)
Dates & Locations:	This subject is not offered in 2014.
Time Commitment:	Contact Hours: 36 hours, comprising of two 1-hour lectures and one 1-hour workshop per week Total Time Commitment: 200 hours
Prerequisites:	One of the following: **Subject** / **Study Period Commencement:** / **Credit Points:** COMP30018 Knowledge Technologies — Semester 1, Semester 2 — 12.50 COMP90049 Knowledge Technologies — Semester 1, Semester 2 — 12.50
Corequisites:	None
Recommended Background Knowledge:	# Basic probability
Non Allowed Subjects:	433-484 Machine Learning 433-679 Evolutionary and Neural Computation 433-680 Machine Learning 433-684 Machine Learning
Core Participation Requirements:	For the purposes of considering request for Reasonable Adjustments under the Disability Standards for Education (Cwth 2005), and Student Support and Engagement Policy, academic requirements for this subject are articulated in the Subject Overview, Learning Outcomes, Assessment and Generic Skills sections of this entry. It is University policy to take all reasonable steps to minimise the impact of disability upon academic study, and reasonable adjustments will be made to enhance a student's participation in the University's programs. Students who feel their disability may impact on meeting the requirements of this subject are encouraged to discuss this matter with a Faculty Student Adviser and Student Equity and Disability Support: http://services.unimelb.edu.au/disability
Contact:	email: **benjamin.rubinstein@unimelb.edu.au** **(mailto:benjamin.rubinstein@unimelb.edu.au)**
Subject Overview:	**AIMS** With exponential increases in the amount of data becoming available in fields such as finance and biology, and on the web, there is an ever-greater need for methods to detect interesting patterns in that data, and classify novel data points based on curated data sets. Learning techniques provide the means to perform this analysis automatically, and in doing so to enhance understanding of general processes or to predict future events. Topics covered will include: supervised learning, semi-supervised and active learning, unsupervised learning, kernel methods, probabilistic graphical models, classifier combination, neural networks and evolutionary algorithms. This subject is intended to introduce graduate students to machine learning though a mixture of theoretical methods and hands-on practical experience in applying those methods to real-world problems. **INDICATIVE CONTENT** Topics covered will include: association rules, clustering, instance-based learning, statistical learning, evolutionary algorithms, swarm intelligence, neural networks, numeric prediction, weakly supervised classification, discretisation, feature selection and classifier combination.

Learning Outcomes:	**INTENDED LEARNING OUTCOMES (ILO)** On completion of this subject the student is expected to: 1 Describe a range of statistical and evolutionary learning algorithms 2 Design, implement and evaluate statistical and evolutionary learning systems to solve real-world problems, based on an appreciation of their relative suitability to different tasks
Assessment:	Two projects due around weeks 7 and 11, expected to take about 36 hours (50%) An end-of-semester examination not exceeding 3 hours (50%) Hurdle requirement: To pass the subject, students must obtain: A mark of at least 25/50 on the exam and also a combined mark of at least 25/50 for the projects Assessment for this subject address both Intended Learning Outcomes (ILOs)
Prescribed Texts:	None
Breadth Options:	This subject is not available as a breadth subject.
Fees Information:	Subject EFTSL, Level, Discipline & Census Date, http://enrolment.unimelb.edu.au/fees
Generic Skills:	On completion of the subject students should have the following skills: # Ability to undertake problem identification, formulation, and solution # Ability to utilise a systems approach to complex problems and to design and operational performance ability to manage information and documentation # Capacity for creativity and innovation # Ability to communicate effectively both with the engineering team and the community at large
Notes:	**LEARNING AND TEACHING METHODS** The subject is delivered through a combination of lectures and tutorials. One feature of the subject is that the projects are designed to be relatively open-ended and broad enough that students have scope to get hands-on experience implementing the breadth of material covered in the subject, as well as building off the subject content in innovating their own methods/ researching related methods from the research literature and implementing them themselves. **INDICATIVE KEY LEARNING RESOURCES** Students will have access to lecture slides, readings relating to the lecture materials (both from a textbook and conference/journal papers), tutorial worksheets with worked solutions for all numeric problems, and sample reports to use in writing the project reports. Students are permitted to do their programming in any language and any programming environment/OS. **CAREERS / INDUSTRY LINKS** Machine learning has been growing rapidly in industry over the past two decades, with key industry players including Google, Microsoft, Amazon, Facebook and Twitter. There have been guest lecturers in the subject from organisations such as NICTA, which has a strong interest in machine learning (indeed one of the primary research groupings within NICTA is based on Machine Learning).
Related Course(s):	Master of Engineering in Distributed Computing Master of Information Technology Master of Information Technology Master of Information Technology Master of Philosophy - Engineering Master of Science (Computer Science) Master of Software Systems Engineering Ph.D.- Engineering
Related Majors/Minors/ Specialisations:	B-ENG Software Engineering stream