MATH 7002 ADVANCED STATISTICAL METHODS

Credit Points 10

Legacy Code 301115

Coordinator Paul Hurley (https://directory.westernsydney.edu.au/search/name/Paul Hurley/)

Description There has been a significant trend away from simple statistical models for complex and Big Data. Advanced Statistical Methods is a technical subject that looks at computer intensive statistical techniques for modelling complex data. Students will learn about methods including Density Estimation, the Expectation-Maximisation (EM) algorithm, Bayesian, Markovian and Hidden Markov Models, enabling them to apply sophisticated statistical tools in a Data Science setting.

School Computer, Data & Math Sciences

Discipline Statistics

Student Contribution Band HECS Band 1 10cp

Level Postgraduate Coursework Level 7 subject

Pre-requisite(s) MATH 7012 AND MATH 7016

Co-requisite(s) COMP 7006

Restrictions

Students must be enrolled in a postgraduate program.

Learning Outcomes

On successful completion of this subject, students should be able to:

1. Describe the axioms of probability and the principle of maximum likelihood.
2. Use density estimation to model continuous data.
3. Apply the EM algorithm (Expectation-Maximisation Algorithm) to maximise complex likelihood functions.
4. Evaluate models using computational techniques
5. Analyse data using Bayesian statistical models and MCMC (Markov-Chain Monte Carlo)

Subject Content

1. Review of Probability Theory and Likelihood
2. Density Estimation
3. Maximum Likelihood and EM algorithm
4. Jack-knife, Bootstrap and Cross-validation
5. Introduction to Bayesian Methods
6. Markovian and Hidden Markov Models

Assessment

The following table summarises the standard assessment tasks for this subject. Please note this is a guide only. Assessment tasks are regularly updated, where there is a difference your Learning Guide takes precedence.

Type	Length	Percent	Threshold	Individual/ Group Task
Quiz	5 x 30 minutes	20	N	Individual
Case Study	2,000 words	40	N	Individual
Applied Project	2,000 words	40	N	Individual

Teaching Periods

Spring (2022)
Parramatta - Victoria Rd
Day
Subject Contact Paul Hurley (https://directory.westernsydney.edu.au/search/name/Paul Hurley/)

View timetable (https://classregistration.westernsydney.edu.au/even/timetable/?subject_code=MATH7002_22-SPR_PS_D#subjects)

Spring (2023)
Parramatta - Victoria Rd
On-site
Subject Contact Paul Hurley (https://directory.westernsydney.edu.au/search/name/Paul Hurley/)

View timetable (https://classregistration.westernsydney.edu.au/odd/timetable/?subject_code=MATH7002_23-SPR_PS_1#subjects)