MAST90062 Probability & Mathematical Statistics I

Credit Points:	12.50
Level:	9 (Graduate/Postgraduate)
Dates & Locations:	This subject is not offered in 2014.
Time Commitment:	Contact Hours: 36 hours comprising 2 one-hour lectures per week and 1 one-hour practice class per week. Total Time Commitment: 3 contact hours and 7 hours private study per week.
Prerequisites:	Any third-year subject in statistics or stochastic processes.
Corequisites:	None
Recommended Background Knowledge:	It is recommended that students have completed a third year subject in probability and statistical inference equivalent to the following:

Subject	Study Period Commencement:	Credit Points:
MAST30020 Probability and Statistical Inference	Semester 1	12.50

Non Allowed Subjects:	None
Core Participation Requirements:	For the purposes of considering requests for Reasonable Adjustments under the Disability Standards for Education (Cwth 2005), and Students Experiencing Academic Disadvantage Policy, academic requirements for this subject are articulated in the Subject Description, Subject Objectives, Generic Skills and Assessment Requirements for this entry. The University is dedicated to provide support to those with special requirements. Further details on the disability support scheme can be found at the Disability Liaison Unit website: http://www.services.unimelb.edu.au/disability/
Contact:	Email: **aihuaxia@unimelb.edu.au (mailto:aihuaxia@unimelb.edu.au)**
Subject Overview:	This subject first reviews the key concepts of probability and distribution theory. Modes of convergence of random variables and distributions are discussed in detail, with an accent on convergence in distribution. The subject introduces distribution determining classes, Helly's theorem, and necessary and sufficient conditions for convergence of distributions in Euclidean spaces. Characteristic functions are studied in depth, inversion formulae for them are proved using a probabilistic argument, and the continuity theorem for characteristic functions is established. The concepts are applied in the second half of the subject which begins with a discussion of empirical distributions and processes, their properties and relationships with the Poisson and Brownian bridge processes. Different types of statistics are introduced, their large sample asymptotic properties are established. The main method of estimator construction (substitution method based on empirical distributions) and the minimum distance estimators(including the maximum likelihood estimator) are discussed. The Pitman estimator is derived, its relationship with Bayes and minimax estimators is discussed. The elements of the general theory of set estimation are presented.
Learning Outcomes:	After completing this subject students should gain: # a deeper understanding of the principles of probability theory and mathematical statistics and some of their important applications. # the ability to pursue further studies in this and related areas.
Assessment:	Up to 40 pages of written assignments (20%: two assignments worth 10% each, due mid and late in semester), a three-hour written examination (80%, in the examination period).
Prescribed Texts:	None

Recommended 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:	In addition to learning specific skills that will assist students in their future careers in science, they will have the opportunity to develop generic skills that will assist them in any future career path. These include: # problem-solving skills: the ability to engage with unfamiliar problems and identify relevant solution strategies; # analytical skills: the ability to construct and express logical arguments and to work in abstract or general terms to increase the clarity and efficiency of analysis; # collaborative skills: the ability to work in a team; # time-management skills: the ability to meet regular deadlines while balancing competing commitments
Related Course(s):	Doctor of Philosophy - Business and Economics Master of Commerce (Finance) Master of Philosophy - Engineering Master of Science (Mathematics and Statistics) Ph.D.- Engineering
Related Majors/Minors/ Specialisations:	Mathematics and Statistics