

Subject Description Form

Subject Code	AMA362
Subject Title	Further Statistical Methods
Credit Value	3
Level	3
Pre-requisite/ Co-requisite/ Exclusion	Statistics for Finance Analytics (AMA2601) or Introduction to Statistics (AMA2634/AMA2634A) or Probability and Distributions (AMA2691) or equivalent
Objectives	This subject is to provide students with further probabilistic and statistical tools with applications in risk management. This course first enables students to have a thorough understanding of portfolio risk modeling in different business sectors, e.g. insurance companies. In addition, nonparametric statistical procedures for analyzing financial data from one or two samples are studied, with emphasis on their applications in finance and economics.
Intended Learning Outcomes	Upon satisfactory completion of the subject, students should be able to: a. gain a basic knowledge and understanding of the utility theory and optimality nature of deductible insurances; b. apply exact and/or recursive evaluations and approximations of tail distributions of portfolio risks; c. understand and apply the probability of bankruptcy and Value-at-Risk in risk management; d. acquire the basic concepts of non-parametric statistics and understand its merits and disadvantages as compared with parametric statistical inference; e. apply commonly-used non-parametric procedures such as the one sample or two samples test for location parameters, or goodness of fit test.
Subject Synopsis/ Indicative Syllabus	<i>Risk modeling (22 hours)</i> Utility theory, stop-loss insurances, optimality of deductible insurances; individual risk models, convolution and method of moment generating functions, normal approximation of tail distributions; collective risk models, Panjer's recursive formula; probability of ruin, Cramer-Lundberg's bound, Value-at-Risk. <i>Nonparametric statistical methods (17 hours)</i> Test of randomness. Sign, Wilcoxon rank sum, Wilcoxon signed-rank, Kolmogorov-Smirnov (one and two samples), goodness-of-fit and rank correlations tests. Nonparametric confidence intervals, applications.
Teaching/Learning Methodology	The subject will be delivered mainly through lectures and tutorials. The lectures will be conducted to introduce further probabilistic and statistical concepts in the syllabus, which are then reinforced by learning activities involving demonstration, tutorial exercise and assignments.

Assessment Methods in Alignment with Intended Learning Outcomes	Specific assessment methods	% weighting	Intended subject learning outcomes to be assessed (Please tick as appropriate)				
			a	b	c	d	e
	1. Assignments	20%	✓	✓	✓	✓	
	2. Tests	20%	✓	✓	✓		
	3. Examination	60%	✓	✓	✓	✓	✓
	Total	100 %					
	Explanation of the appropriateness of the assessment methods in assessing the intended learning outcomes: The subject focuses on knowledge, skill and understanding of Further Statistical Methods , thus, Exam-based assessment is the most appropriate assessment method, including 20% test and 60% examination. Moreover, 20% worth of assignments are included as a component of continuous assessment so as to keep the students in progress. Continuous Assessment comprises of assignments and tests. A written examination is held at the end of the semester.						
Student Study Effort Expected	Class contact:						
	• Lecture					26 Hrs.	
	• Tutorial					13 Hrs.	
	Other student study effort:						
	• Assignment					40 Hrs.	
	• Self-study					30 Hrs.	
	Total student study effort					109 Hrs.	
Reading List and References	<u>Textbooks:</u>						
	Higgins, J.J.	An introduction to modern nonparametric statistics 1 st edition	Brooks/Cole 2004				
	<u>References:</u>						
	Larsen, R.J. & Marx, M.L.	An Introduction to Mathematical Statistics and its Applications 5 th edition	Prentice Hall 2011				
	Bowers et. al.	Actuarial Mathematics 2 nd edition	Society of Actuaries 1998				
	Buhlmann, H.	Mathematical methods in risk theory	Springer-Verlag 2005				
	Hogg, R.V., McKean, J.W. &	Introduction to Mathematical Statistics 7 th edition	Prentice Hall 2012				

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