

Subject Description Form

Subject Code	AMA4840
Subject Title	Decision Analysis
Credit Value	3
Level	4
Pre-requisite	Introduction to Statistics for Business (AMA1501) or Introduction to Statistics (AMA1502/AMA1602) or Probability and Engineering Statistics (AMA2104) or Probability and Distributions (AMA2691) or Mathematical Methods for Finance (AMA2703) or equivalent
Exclusion	Decision Analysis (AMA484)
Objectives	This subject is to enable students to understand the theory and methods for decision analysis under uncertainty, to appreciate the use of expert judgment and value of information in decision making and risk management, and to apply them in industrial and financial areas.
Intended Learning Outcomes	Upon satisfactory completion of the subject, students should be able to: <ul style="list-style-type: none"> a. discuss the basic principles and assumptions for decision analysis; b. synthesize the decision making knowledge and techniques required in solving real-life problems; c. formulate mathematical models for practical decision problems, and assess critically the appropriateness of model used; d. solve decision problems and present decision analysis results; e. make recommendations for actions based on analysis results; f. define, formulate and solve problems in a systematic approach; g. communicate effectively in a well-structured manner and build up an open-minded attitude.
Subject Synopsis/ Indicative Syllabus	<p><i>Preliminary probability theory: (6 hours)</i> Review of probability theory, prior and posterior distributions, Bayes' theorem, choice of prior: bets, conjugate families of distributions, vague and improper priors.</p> <p><i>Structure of decision analysis models: (8 hours)</i> Nature and classification of decision analysis problems, decision trees, Bayesian intervals for parameters and predictions, decision analysis with sampling, expected value of information (perfect and imperfect), sensitivity analysis.</p> <p><i>Decision analysis under uncertainty: (6 hours)</i> The maximin/maximax/Laplace criterion, criterion of realism, the minimax regret criterion, minimax decisions and Bayes' solutions including simple results,</p>

	<p>game theory.</p> <p><i>Decision analysis under risk: (6 hours)</i> Risk attitudes, measures of risk, risk premium, subjective measures and utility theory.</p> <p><i>Decision analysis with multiattributes: (6 hours)</i> Conflicting objectives, analytic hierarchy process, goal programming, multi-attribute utility models, Pareto optimal, efficient frontier.</p> <p><i>Applications: (7 hours)</i> Capital investment, inventory control, other industrial and financial applications.</p>																																																												
<p>Teaching/Learning Methodology</p>	<p>The subject will be delivered mainly through lectures and tutorials. The lectures will be conducted to introduce the concepts of decision analysis in the syllabus, which are then reinforced by learning activities involving demonstration, tutorial exercise and assignments.</p>																																																												
<p>Assessment Methods in Alignment with Intended Learning Outcomes</p>	<table border="1" data-bbox="485 891 1431 1227"> <thead> <tr> <th rowspan="2">Specific assessment methods</th> <th rowspan="2">% weighting</th> <th colspan="7">Intended subject learning outcomes to be assessed (Please tick as appropriate)</th> </tr> <tr> <th>a</th> <th>b</th> <th>c</th> <th>d</th> <th>e</th> <th>f</th> <th>g</th> </tr> </thead> <tbody> <tr> <td>1. Assignments</td> <td>15%</td> <td>✓</td> <td></td> <td>✓</td> <td></td> <td></td> <td></td> <td>✓</td> </tr> <tr> <td>2. Tests</td> <td>25%</td> <td></td> <td></td> <td>✓</td> <td>✓</td> <td></td> <td></td> <td></td> </tr> <tr> <td>3. Examination</td> <td>60%</td> <td></td> <td>✓</td> <td>✓</td> <td>✓</td> <td>✓</td> <td>✓</td> <td></td> </tr> <tr> <td>Total</td> <td>100 %</td> <td colspan="7"></td> </tr> </tbody> </table> <p>Explanation of the appropriateness of the assessment methods in assessing the intended learning outcomes: The subject focuses on knowledge, skill and understanding of Decision Analysis, 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.</p>									Specific assessment methods	% weighting	Intended subject learning outcomes to be assessed (Please tick as appropriate)							a	b	c	d	e	f	g	1. Assignments	15%	✓		✓				✓	2. Tests	25%			✓	✓				3. Examination	60%		✓	✓	✓	✓	✓		Total	100 %							
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<p>Student Study Effort Expected</p>	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>Textbook:</u> Winston, W.L. Introduction to Probability Models: Operations Research, Volume II 4 th edition Brooks/Cole 2004 Pratt, J.W., Raiffa, H. & Schlaifer, R. Introduction to Statistical Decision Theory The MIT Press 2008 <u>References:</u> Goodwin, P. & Wright, G. Decision Analysis for Management Judgment 4 th edition Wiley 2010 Clemen, R.T. & Reilly, T. Making Hard Decisions with Decision Tools 1 st edition Duxbury Press 2003	