

Subject Description Form

Subject Code	AMA382
Subject Title	Operations Research Methods
Credit Value	3
Level	3
Pre-requisite	Calculus (AMA1007) or Calculus and Linear Algebra (AMA1008) or Calculus I (AMA1101) or Calculus IA (AMA1102) or Basic Mathematics II – Calculus and Linear Algebra (AMA1120) or Calculus for Engineers (AMA1130) or Intermediate Calculus and Linear Algebra (AMA2007) or Mathematics I (AMA2111) or Advanced Calculus and Linear Algebra (AMA2701/AMA2701A) or Mathematical Methods for Finance (AMA2703/AMA2703A) or Mathematics for Engineers (AMA2308) or Engineering Mathematics (AMA2380) or Applied Mathematics II (AMA2512) or Mathematics for Scientists and Engineers (AMA2882) or Engineering Mathematics (AMA290) or equivalent
Objectives	This subject is to introduce students to the techniques for solving operations research problems and to enable them to choose the correct techniques to suit a particular problem with applications in resource management, network models, decision analysis, inventory management, queuing management, and project management.
Intended Learning Outcomes	Upon satisfactory completion of the subject, students should be able to: a) implement several basic deterministic and stochastic operations research models; b) synthesize the mathematical knowledge and techniques required in operations research model formulation; c) identify, define and formulate operations research problems in a systemic approach; d) execute and appraise the main algorithms for solving such operations research problems; e) interpret the results of these operations research algorithms; f) evaluate critically for improvement in solutions; g) communicate effectively in a well-structured manner and build up an open-minded attitude.
Subject Synopsis/ Indicative Syllabus	<i>Network flow models (8 hours)</i> Shortest path problem, critical path problem (PERT), minimal spanning tree

	<p>problem, maximal flow problem.</p> <p><i>Integer programming models (8 hours)</i> Formulate operations research problems as integer programming, related decisions, exclusive decisions, contingent decisions, either-or constraints, fixed charge problems, total unimodularity, branch and bound method.</p> <p><i>Inventory management (8 hours)</i> Deterministic inventory model, continuous review, shortage allowed, quantity discounts, periodic review, stochastic inventory model.</p> <p><i>Queuing theory (6 hours)</i> Structure of queuing models, input source, queuing system, inter-arrival time, service time, exponential distribution, Poisson distribution, birth-death process, steady state, M/M/1 system.</p> <p><i>Linear Programming (9 hours)</i> Modeling with linear programming; simplex method; sensitivity analysis.</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 basic operation research concepts and techniques of the topics in the syllabus, which are then reinforced by learning activities involving demonstration, tutorial exercise and assignments/quizzes.</p>																																																											
<p>Assessment Methods in Alignment with Intended Learning Outcomes</p>	<table border="1" data-bbox="456 1122 1433 1458"> <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/ Quizzes</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></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></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 Operations Research Methods, thus, Exam-based assessment is the most appropriate assessment method, including 25% test and 60% examination. Moreover, 15% worth of assignments / quizzes are included as a component of continuous assessment so as to keep the students in progress. Continuous Assessment comprises of assignments and/or quizzes, 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/ Quizzes	15%		✓	✓	✓	✓	✓	✓	2. Tests	25%		✓	✓	✓	✓	✓		3. Examination	60%	✓	✓	✓	✓	✓	✓		Total	100 %							
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Total	100 %																																																											
<p>Student Study Effort Expected</p>	<p>Class contact:</p>																																																											
	<ul style="list-style-type: none"> Lecture 						<p>26 Hrs.</p>																																																					

