

Subject Description Form

Subject Code	AMA502
Subject Title	Operations Research Methods
Credit Value	3
Level	5
Pre-requisite/ Co-requisite/ Exclusion	Exclusion: MGT 532 "Deterministic Operations Research" or its equivalent.
Objectives	To enable students to appreciate the use of mathematical, computational and statistical techniques in solving real engineering management problems.
Intended Learning Outcomes	<p>Upon completion of the subject, students will be able to:</p> <ul style="list-style-type: none"> (a) Integrate the mathematical and statistical knowledge and techniques required in operations research model formulation. (b) Execute and appraise the main algorithms for solving operations research problems. (c) Interpret the results of these operations research algorithms. (d) Evaluate critically for improvement in solutions.
Subject Synopsis/ Indicative Syllabus	<p>Regression, forecasting, test of significance, goodness-of-fit, Bayesian methods; network, PERT/CPM (Program Evaluation and Review Technique/Critical Path Method), scheduling; stock control; linear programming, decision making.</p> <ol style="list-style-type: none"> 1. Basic Statistical Inference: <ul style="list-style-type: none"> (a) Least squares method and regression; test of model parameter; simple transformation; coefficient of correlation. (b) Statistical hypotheses; application of z, t and chi-square tests; Goodness-of-fit (c) Bayes' Theorem, prior and posterior distributions 2. Project management: <p>Network diagrams; cost analysis of a project; probabilistic considerations of project duration; resources scheduling.</p> 3. Inventory management: <ul style="list-style-type: none"> (a) Formulating an inventory policy; derivation and use of the EOQ (Economic Order Quantity) formula; adjusting the EOQ formula for uniform replenishment; the effect of lack of certainty as to demand and lead-time. (b) Economic Order Quantity with planned shortage, Economic Production Lot Size. 4. Resource management: <p>Formulation of linear programs in production and resources scheduling problems; graphical solution of two-variable linear programming problem; dual problems; method of simplex solutions; transportation and assignment model.</p>

Teaching/Learning Methodology	The subject will be delivered mainly through lectures and tutorials. The teaching and learning approach is mainly problem-solving oriented. The approach aims at the development of mathematical techniques and how the techniques can be applied to solving problems. Students are encouraged to adopt a deep study approach by employing high level cognitive strategies, such as critical and evaluative thinking, relating, integrating and applying theories to practice.																																																					
Assessment Methods in Alignment with Intended Learning Outcomes	<table border="1"> <thead> <tr> <th rowspan="2">Specific assessment methods/tasks</th> <th rowspan="2">% weighting</th> <th colspan="4">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> </tr> </thead> <tbody> <tr> <td>1. Assignments/Project</td> <td>25%</td> <td>✓</td> <td>✓</td> <td>✓</td> <td>✓</td> </tr> <tr> <td>2. Mid-term test</td> <td>25%</td> <td>✓</td> <td>✓</td> <td>✓</td> <td>✓</td> </tr> <tr> <td>3. Examination</td> <td>50%</td> <td>✓</td> <td>✓</td> <td>✓</td> <td>✓</td> </tr> <tr> <td>Total</td> <td>100 %</td> <td colspan="4"></td> </tr> </tbody> </table> <p>Continuous Assessment comprises of assignments/ project and a mid-term test. A written examination is held at the end of the semester.</p>						Specific assessment methods/tasks	% weighting	Intended subject learning outcomes to be assessed (Please tick as appropriate)				a	b	c	d	1. Assignments/Project	25%	✓	✓	✓	✓	2. Mid-term test	25%	✓	✓	✓	✓	3. Examination	50%	✓	✓	✓	✓	Total	100 %																		
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	DeGroot, Morris H. and Schervish, Mark J.	Probability and Statistics, 5 th Edition	Pearson, 2019
	Hillier, F.S. and Lieberman, G.J.	Introduction to Operations Research, 10 th Edition	McGraw Hill, 2014
	Taha, H.A.	Operations Research, 5th Edition	MacMillan, 1992
	Winston, W. L. and Venkataramanan, M.	Introduction To Mathematical Programming, Operations Research: Volume One, 4 th Edition	Brooks/Cole-Thomson Learning, 2002