

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> <ol 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: <ol 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: Network diagrams; cost analysis of a project; probabilistic considerations of project duration; resources scheduling. 3. Inventory management: <ol 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: 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.
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	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 %					
Continuous Assessment comprises of assignments/ project and a mid-term test. A written examination is held at the end of the semester.							
Student Study Effort Required	Class contact:						
	▪ Lecture					26 Hrs.	
	▪ Tutorial					13 Hrs.	
	Other student study effort:						
	▪ Assignment					20 Hrs.	
	▪ Case study/Mini-project					38 Hrs.	
	▪ Self-study					40 Hrs.	
	Total student study effort					137 Hrs.	
Reading List and References	Johnson, Richard A.	<i>Miller's & Freund's Probability and Statistics for Engineers</i> , 8th Edition	Prentice Hall, 2011				
	Milton, J.S. and Arnold, J.C.	<i>Introduction to Probability and Statistics: Principles and Applications for Engineering and the Computing Sciences</i> , 4th Edition	McGraw Hill, 2002				
	Miller, I. and Miller, M.	<i>John E. Freund's Mathematical Statistics with Applications</i> , 8 th Edition	Pearson, 2012				
	Hogg, R. V., Tanis, E. and Zimmerman, D.	<i>Probability and Statistical Inference</i> , 10 th Edition	Pearson, 2019				
	DeGroot, Morris H. and Schervish, Mark	<i>Probability and Statistics</i> , 5 th Edition	Pearson, 2019				

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	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