

<b>Title</b>	<b>BMAN60092 Risk, Performance and Decision Analysis</b>
<b>Credit Rating</b>	15
<b>Level</b>	MSc
<b>Semester</b>	2
<b>Course Coordinator(s)</b>	Prof Jian-Bo Yang – lectures and workshops
<b>Methods of Delivery</b>	Lectures/Workshops
<b>Lecture Hours</b>	30
<b>Seminar Hours</b>	
<b>Private Study Hours</b>	120
<b>Total Study Hours</b>	150
<b>Pre-requisites</b>	BMAN60101 Mathematical Programming and Optimisation
<b>Co-requisites</b>	N/A
<b>Dependant Courses</b>	N/A
<b>Assessment Methods and Relative Weightings</b>	50% Exam (close book, 2.5 hours) 50% Coursework (35% individual report and 15% group presentation)
<b>Aims</b>	
<p>This course unit covers risk, performance and decision modelling and analysis, including risk modelling and assessment, both single and multiple criteria decision modelling and analysis, data envelopment analysis and multiple objective optimisation. Emphasis will be placed on the integrated applications of these methods and tools to performance and efficiency analysis and planning. The aim is to familiarise students with the applications of decision modelling and performance analysis methodologies.</p>	
<b>Learning Outcomes</b>	
<p>At the end of the course unit students should be familiar with concepts, methods and tools for decision tree analysis, multiple criteria decision analysis, data envelopment analysis and multiple objective optimisation, which they can apply to support decision making and deal with performance assessment and efficiency analysis problems. They should also be able to use appropriate software tools such as Excel and IDS Multicriteria Assessor.</p>	
<b>Syllabus</b>	
<p>The following topics will be covered:</p> <ul style="list-style-type: none"> <li>• Risk analysis and modelling. Decision analysis under risk and uncertainty (maximum expected monetary decision criterion, decision tree analysis and Bayes' Theorem)</li> <li>• Certain monetary equivalent, utility theory and modelling of decision maker's preferences.</li> <li>• Concepts, classification, problem structuring and model building for multiple criteria analysis and performance assessment using financial and non-financial criteria.</li> </ul>	

- Preference modelling and weight assignment
- Performance assessment using the evidential reasoning approach
- Methods and tools for multiple criteria decision analysis
- Definition, measurement, and assessment of efficiency
- Data Envelopment Analysis models and tools for efficiency assessment
- Concepts, methods and tools for Multiple Objective Linear Programming (MOLP)
- Goal Programming (GP) and interactive MOLP methods for setting performance targets

### Reading List

Belton, V., Stewart, T. J. (2002), Multiple Criteria Decision Analysis: An Integrated Approach. Kluwer Academic Publishers: Dordrecht.

Cooper, W. W, Seiford, L. M. and Tone, K. (2007), Data Envelopment analysis: a comprehensive text with models, applications, references and DEA Solver software. 2<sup>nd</sup> edition, Springer.

Hillier, F. and Lieberman, G. (2010), Introduction to Operations Research with CD-Rom. McGraw Hill.

Keeney, R.L. and Raiffa, H. (1993), Decision with Multiple Objectives: Preference and Value Tradeoffs. Cambridge University Press.

Liu G. P., Yang J. B. and Whidborne, J. F. (2002), Multiobjective Optimisation and Control. Engineering Systems Modelling and Control Series, Research Studies Press Limited, Baldock, Hertfordshire, England.

Saaty, T. L. (1988), The Analytic Hierarchy Process. University of Pittsburgh, 1988.

Sen, P. and Yang, J. B. (1998), Multiple Criteria Decision Support in Engineering Design, Springer. London, ISBN 3540199322.

Xu, D. L. and Yang, J. B. (2003), Intelligent decision system for self-assessment, Journal of Multiple Criteria Decision Analysis, Vol.12, 43-60.

Xu, D. L., McCarthy, G. and Yang, J. B., (2006) Intelligent decision system and its application in business innovative capability assessment, Decision Support Systems, Vol.42, pp.664-673.

Yang, J. B. (2001), Rule and utility based evidential reasoning approach for multiple attribute decision analysis under uncertainty, European Journal of Operational Research, Vol. 131, No.1, pp.31-61.

Yang, J. B. and Xu, D. L. (2002), On the evidential reasoning algorithm for multi-attribute decision analysis under uncertainty, IEEE Transactions on Systems, Man, and Cybernetics Part A: Systems and Humans, Vol.32, No.3, pp.289-304.

Yang, J. B., Wang, Y. M., Xu, D. L. and Chin, K. S. (2006), The evidential reasoning approach for MCDA under both probabilistic and fuzzy uncertainties, European Journal of Operational Research, Vol. 171, No.1, pp.309-343.

**NOTE:** additional references/readings will be given in lectures