

## Course on Multi-Criteria Decision Analysis

Lecture	Wed 13.3.13	09:00-11:00	B6, A3.02
Tutorial	Wed 13.3.13	13:00-15:00	B6, A3.02

### Class Outline Structure:

#### 5-hour class of lecture, exercises and active debate of the issues.

- An interactive, 2-hours lecture, with a break in between, will start off the session, where the concepts of Multiple Criteria Decision Modelling will be explored and key issues discussed. No prior knowledge will be needed. The course addresses mathematics, informatics, economists and business students at all levels (Bachelor, Master, Phd).
- Students, working in pairs, using the MakeItRational Websoftware package (<http://makeitrational.com/>) to develop a decision model. Please bring a laptop.
- Students, working in pairs, will then prepare and present a short case study (5 mins) on the problem that they have researched (guidance will be given on this).
- As a plenary group, we will feedback this knowledge and develop a methodology for decision making.

### Aims and Objectives:

1. To understand the concept of decision analysis, and how to model problems.
2. To be able to develop a cohesive model incorporating benefits, cost, opportunities, and risk issues.
3. To be able to use supporting decision making software

### Presenter: Dr Alessio Ishizaka (University of Portsmouth)

Alessio Ishizaka is Senior Lecturer in Operations and Supply Chain Management at the Portsmouth Business School of the University of Portsmouth. He received his PhD from the University of Basel (Switzerland). He then worked successively for the University of Exeter (UK), University of York (UK) and Audencia Grande Ecole de Management (France). His research is in the area of decision-making, where he published several papers on AHP. He was the co-organiser of a special AHP stream on the 50<sup>th</sup> Operational Research Society Conference, York, 2008.



## Synopsis:

This class examines techniques for decision analysis. Decision-making is the most central human activity, intrinsic in our biology and done both consciously and unconsciously. We need it to survive. Taking a decision is not just a question of selecting a best alternative. Often one needs to prioritise all the alternatives for resource allocation among a portfolio of option, or to examine the effect of changes introduced to initial judgements.

Breaking a problem down into its constituent parts or components, in the framework of a hierarchy, and establishing importance or priority to rank the alternatives is a comprehensive and general way to look at the problem in a formal manner. This kind of concern has been called multicriteria decision-making (MCDM). In operational research and management science today, decision-making is essentially thought of in the focused area of research concerned with goals and criteria and how to measure and rank them.

In our complex world, there are usually many solutions proposed for each problem. Each of them would entail certain outcomes that are more or less desirable, more or less certain, in the short or long term, and would require different amounts and kinds of resources. We need to set priorities on these solutions according to their effectiveness by considering their benefits, costs, risks, and opportunities, and the resources they need.

Through the use of hierarchic structure, the Analytic Hierarchy Process (AHP), a technique for MCDM, attempts to incorporate the objectives, criteria, actors, time frames and alternatives that have bearing on the decision. It accommodates all the factors that some people believe should be included in describing the decision problem. Their judgments are then applied to relate and compare these factors in a systematic manner that leads to priorities and to the synthesis of these priorities to derive an overall priority.

## Indicative Reading

**Alessio Ishizaka, Philippe Nemery, Multi-criteria Decision Analysis: Methods and Software , Wiley, July 2013 ISBN: 978-1-1199-7407-9**

Ishizaka Alessio, Pearman Craig, Nemery Philippe (2012) *AHPSort: an AHP based method for sorting problems*, International Journal of Production Research, 50(17), 4767-4784,

Ishizaka Alessio (2012), *A multicriteria approach with AHP and clusters for the selection among a large number of suppliers*, Pesquisa Operacional, 32(1): 1-15

Ishizaka Alessio, Balkenborg Dieter, Kaplan Todd (2011), *Does AHP help us make a choice? - An experimental evaluation*, Journal of the Operational Research Society, 62(10), 1801-1812

Ishizaka Alessio, Labib Ashraf (2011), *Review of the main developments of AHP*, Expert Systems with Applications, 38(11),14336-14345

Ishizaka Alessio, Labib Ashraf (2011), *Selection of new production facilities with the Group Analytic Hierarchy Process Ordering Method*, Expert Systems with Applications, 38(6),7317–7325

Ishizaka Alessio, Labib Ashraf (2009), *Analytic Hierarchy Process and Expert Choice: Benefits and Limitations*, ORInsight, 22(4), p. 201–220

Ishizaka Alessio, Lusti Markus (2006), *How to derive priorities in AHP: a comparative study*, Central European Journal of Operational Research, 14(4), p. 387-400