IE 546 ECONOMIC DECISIONS IN ENGINEERING

Instructor - Professor S.Y. Nof   TA – Xin W. Chen

 Note: Unless your email is personal, kindly email <u>both of us</u> through the BlackBoard
       class website.

MWF 11:30 - 12:20 POTR 262   Office hours: Will be announced in class

Course Objective

We will learn decision making and rationality, including decision analysis; decision making under uncertainty; various descriptive and prescriptive models from operations research, economics, psychology and business. Applications are drawn from engineering decision-making, public policy, and personal decision-making. Attention is also paid to designing aids to improve decision-making. Use of risk analysis software is optional (not required).

Brief Course Description

Classical decision theory, deterministic decision rules, decision trees, influence diagrams, single/multiple stage analysis, sensitivity analysis; subjective probability, heuristics and biases, Bayesian methods, conjugate belief forms, inference, belief assessment methods, value of information, legal reasoning, risk analysis; utility theory, risk aversion, conflicting objectives, multi-attribute decision theory, analytic hierarchy process.

Text

 Required; R.T. Clemen and T. Reilly, Making *Hard Decisions With Decision Tools Suite Updated Edition* 2004 ISBN 0-495-01508-3

(You can also use the 2001 Edition ISBN 0-534-51692-0 but it has errata, which you will need to correct).

Class Format

3 tests - 90%, Homework/class participation - 10%, optional project

- Additional readings marked with *

Week/ Topics/ Chapter and Handout Readings

1-5 Classical decision theory: deterministic decision rules, decision trees, influence
diagrams, single/multiple stage analysis, sensitivity analysis. 1,2,3,4,5   1*

TEST 1. Monday Feb 09

6-11 Subjective probability, heuristics and biases, Bayesian methods, conjugate belief
forms, inference, belief assessment methods, value of information, legal reasoning,
risk analysis.   7-10,12   2*

TEST 2. Monday Mar 23

12-16 Utility theory, risk aversion, conflicting objectives, multi-attribute decision theory,
analytic hierarchy process   13 -17   3*, 4*, 5*, 6*

TEST 3. Finals Week

* Classic Decision Analysis Handouts (will be posted on IE 546 BlackBoard)

1* Chapter 8 from W.T. Morris, 1977, *Decision Analysis*, Grid, Inc., Columbus, OH.

2* Chapter 4 from D. Winterfeldt and W. Edwards, 1986, *Decision Analysis and
Behavioral Research*, Cambridge Press, Cambridge.

3* Chapter 7 from D. Winterfeldt and W. Edwards, 1986, *Decision Analysis and
Behavioral Research*, Cambridge Press, Cambridge.

4* Chapter 8 from D. Winterfeldt and W. Edwards, 1986, *Decision Analysis and
Behavioral Research*, Cambridge Press, Cambridge.

5* Chapter 8 from T.L. Saaty, 1986, *Hierarchies and Priorities*

6* F. Zahedi, 1986, The Analytic Hierarchy Process – A Survey of the Method and its
Applications, *Interfaces*, 16:4, July-August, pp. 96-108.