IE 546 – ECONOMIC DECISIONS IN ENGINEERING

Instructor – Dr. Andrew Liu, andrewliu@purdue.edu
TA – To be announced
MWF 4:30 pm - 5:20 pm, Wetherill Lab of Chemistry 320
Office hours: MW 5:30 – 6:30 PM (location to be announced)

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

Class Format
- 3 tests – 70%, Homework – 20%, Case study (class participation) - 10%
- For class discussion purpose, please place a name tag in front of your seat and sit at the same location each class
- Additional readings marked with *

## Week/ Topics/ Chapter and Handout Readings

<table>
<thead>
<tr>
<th>Week</th>
<th>Topics</th>
<th>Chapter and Handout Readings</th>
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<tbody>
<tr>
<td>1-5</td>
<td>Classical decision theory: deterministic decision rules, influence diagrams, decision trees, single/multiple stage analysis, sensitivity analysis.</td>
<td>1, 2, 3, 4, 5 1*</td>
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<tr>
<td>TEST 1</td>
<td>Wednesday, Feb 17</td>
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<tr>
<td>6-11</td>
<td>Probability basics, subjective probability, heuristics and biases, Bayesian methods, conjugate belief forms, inference, belief assessment methods, value of information, risk analysis.</td>
<td>7-10, 12 2*</td>
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<tr>
<td>TEST 2</td>
<td>Wednesday Mar 24</td>
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<tr>
<td>12-16</td>
<td>Utility theory, risk aversion, conflicting objectives, multi-attribute decision theory, analytic hierarchy process</td>
<td>13 -16 3*, 4*, 5*, 6*</td>
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<tr>
<td>Final Exam</td>
<td>Finals Week</td>
<td></td>
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* **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.
5* Chapter 8 from T.L. Saaty, 1986, *Hierarchies and Priorities*