IE7720: Decision & Risk Analysis  
Course Syllabus - Fall 2014

Instructor:  Dr. Kenneth Chelst, Professor, Global Executive Track  
Industrial and Systems Engineering

Classroom:  MEB Conference Room, Industrial & Systems Engineering Department
Contact:  kchelst@wayne.edu / 313-577-3857
Office:  Room 2069, 4815 Fourth Street, Detroit, MI 48202  
Office Hours:  By Appointment
Web Site:  http://blackboard.wayne.edu

Prerequisites:  Executive Ph.D. Track Candidate

Software:  Precision Tree: an Excell add-on from Palisade’s Corp.

Web Site:  PowerPoint Slides, articles, handouts, syllabus, answers to homework, and online access to grades are available on http://blackboard.wayne.edu. Additionally, announcements will be posted on Blackboard and emailed out to the email addresses registered on Blackboard.

Program Mission:  To provide the opportunity for working executives to combine real-world experience with academic skills to create a new class of technical leaders who embrace integrative thinking, are globally aware, and are capable of producing sustainable value to any organization throughout the world.

Overview  
The course will focus on complex decisions that involve tradeoffs amongst objectives or are made in the face of uncertainty. Course lectures will focus on three interrelated tools.  
1) Influence Diagrams to frame decisions  
2) Multi-Criteria Decision Analysis (also called Multi-attributed utility theory) and 3) Decision Trees. It will then explore the soft side of decision making and the related research. Approximately 40% of the course will focus on research issues and methodologies in decision making.

Course Goals
1) Understand the limitations of intuition as a valid decision guide
2) Identify common biases and barriers to quality and efficient decision making
3) Learn to recognize opportunities to apply decision analytic tools.
4) Develop specific skills in  
   a) framing and structuring complex decision problems.
   b) analyzing decisions involving tradeoffs amongst objectives.
   c) analyzing decisions involving uncertainty.
5) Develop an understanding of biases and barriers towards “rational” decision making
6) Learn about the major research journals in the field
7) Learn about various research designs and experiments within the field
8) Carry out a literature thread discussion

Mini-Project – Proposal for a Get Case Study
Final Project – Literature Thread
   - Start with an article published since 2010 that includes an experimental design.
   - Develop a 6 to 8 article research thread that begins with a classic article that started this thread of research and ends with current paper.

2014 GET Decision & Risk Analysis –Course Outline
Text & Readings: Chelst and Canbolat. – Value Added Decision Making for Managers (CRC 2012)
There will be supplementary readings posted at least 3 weeks in advance. Barry Schwartz - The Paradox of Choice: Why More Is Less
- Prologue and Chapters 1, 2, 4, 6, 7, and 11.

Software
1. Precision Tree: an Excel add-on from Palisade’s Corp. ➔ Decision Trees
2. Logical Decisions ➔ Tradeoffs amongst objectives: MAUT & AHP

Special Needs: If you have a documented disability that requires accommodations, you will need to register with Student Disability Services for coordination of your academic accommodations. The Student Disability Services (SDS) office is located at 1600 David Adamany Undergraduate Library in the Student Academic Success Services department. SDS telephone number is 313-577-1851 or 313-577-3365 (TDD only). Once you have your accommodations in place, we will be glad to meet with you privately during office hours to discuss your special needs. Please refer to the SDS website for further information about students with disabilities and the services we provide for faculty and students: http://studentdisability.wayne.edu

Attendance: We strongly recommend that learning partners attend all classes in person. In case of travel, join the class remotely. Contact Mr. Mark Garrison at mark.garrison@wayne.edu for making arrangements for remote participation.

Honesty: Learning partners registered for this course should obey the rules of academic integrity and follow the code of conduct. Please look at the following document: http://www.doso.wayne.edu/codeofconduct.pdf.

Decision & Risk: Topic and Class Schedule

<table>
<thead>
<tr>
<th>#</th>
<th>Thursdays</th>
<th>Topic</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Sept. 4</td>
<td>Decision Framing</td>
<td>5:00-9:40 PM</td>
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<tr>
<td>2</td>
<td>Sept. 18</td>
<td>Multi-Attribute Utility Theory MAUT</td>
<td>5:00-9:40 PM</td>
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<tr>
<td>3</td>
<td>Oct. 2</td>
<td>Decision Trees</td>
<td>5:00-9:40 PM</td>
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<tr>
<td>4</td>
<td>Oct. 23</td>
<td>Risk Management</td>
<td>5:00-9:40 PM</td>
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<tr>
<td>5</td>
<td>Nov. 6</td>
<td>Forecasting Bias</td>
<td>5:00-9:40 PM</td>
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<tr>
<td>6</td>
<td>Nov. 20</td>
<td>Applications &amp; Decision Making Bias</td>
<td>5:00-9:40 PM</td>
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<tr>
<td>7</td>
<td>Dec. 4</td>
<td>Case Study Ideas &amp; Multiple Perspectives</td>
<td>5:00-9:40 PM</td>
</tr>
<tr>
<td>8</td>
<td>Dec. 11</td>
<td>Literature Thread Presentations</td>
<td>5:00-9:40 PM</td>
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2014 GET Homework Assignments

<table>
<thead>
<tr>
<th>Due Date</th>
<th>Title</th>
<th>Points</th>
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<tbody>
<tr>
<td>Mon. Sept. 22nd</td>
<td>Hard Decisions and Influence Diagrams</td>
<td>15</td>
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<tr>
<td>Mon. Oct. 27th</td>
<td>Decision tree - Precision tree software</td>
<td>15</td>
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<tr>
<td>Thurs Nov. 6th</td>
<td>Lead one article discussion - forecast bias</td>
<td>5</td>
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<tr>
<td>Mon. Nov. 10th</td>
<td>Risk management paper</td>
<td>15</td>
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<tr>
<td>Thurs. Nov. 20th</td>
<td>Application Presentation</td>
<td>15</td>
</tr>
<tr>
<td>Thurs Nov. 20th</td>
<td>Lead one article discussion - decision bias</td>
<td>5</td>
</tr>
<tr>
<td>Wed. Nov. 26th</td>
<td>Bias paper</td>
<td>15</td>
</tr>
<tr>
<td>Mon. Dec. 1st</td>
<td>Case Study Proposal</td>
<td>25</td>
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<tr>
<td>Thurs. Dec. 11th</td>
<td>Literature Thread</td>
<td>80</td>
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<tr>
<td>All Thursdays</td>
<td>Discussions of Textbook Readings 1.5pt/week</td>
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Grade based on 200 points
Assignments 2, 3, 5, 8 and 9 must be completed.
Otherwise, students have option of dropping assignments worth up to 15 points.

2014 GET Decision & Risk Analysis – Course Outline
September
1) 9/4/14 Decision Complexity and Intuition – Chapters 1, 2 and 3
   a) Limitation of intuition and instinct
   b) Overview of common biases
   c) Influence Diagram tool to frame decisions involving uncertainty and/or multiple objectives
   d) Classes of Decision Problems
   e) Introduce Multiple Criterion Decisions

2) 9/18/14 Multiple Objective Tradeoffs – MAUT Chapters 4, 5 and 6
   a) Multiple Objectives Hierarchy
   b) Introduction to Logical Decisions
   c) Assign weights
   d) Nonlinear SUF
   e) Interpretation of results
   f) Risk and Value Management

October
3) 10/2/14 Decision with Uncertainty – Chapters 10, and 11
   a) Decision Tree Structure
   b) Decision Tree Analysis – by hand
   c) Risk Profile vs. Expected Value
   d) Asymmetric Tree
   e) Sequential Decisions
   f) Precision Tree Software - Analysis
   g) Value of delay
   h) Value of Information – perfect and imperfect
   i) Structured Risk management

4) 10/16/12 Risk Management - Chapters 8 and 12 and Research Topics in MAUT and Decision Trees
   a) Identify Risk
   b) Risk Management Strategies
   c) Utility Theory and Risk Attitude
   d) Weights in MAUT
   e) Group decision
   f) Research topics

November
5) 11/6/12 Forecasting Bias and Research – Chapter 13 plus Research Article
   a) Common forecasting biases – overconfidence, faulty probability theory, poor intuition, illusion of control, etc.
   b) Journals – Sample articles (each student will read and lead discussion of one article)

6) 11/20/12 Decision Making Biases and Research – Chapters 14 and 15 plus Research Article
   a) Applications – Student Presentations
   b) Sunk Cost, Status Quo, Targets, optimism, etc.
   c) Journals – Sample articles (each student will read and lead discussion of one article)

December
7) 12/6/10 Multiple perspectives – Chapters 15 and 16 plus Case Studies
   a) Case Study presentations
   b) Negotiated decisions
   c) Ethical decisions

8) 12/13/10 Literature Thread presentations