

**DEPARTMENT OF INDUSTRIAL ENGINEERING
COURSE SYLLABUS**

<i>COURSE TITLE</i>	<i>ENGLISH CODE/NO</i>	<i>ARABIC CODE/NO.</i>	<i>CREDITS</i>			
			<i>Th.</i>	<i>Pr.</i>	<i>Tr.</i>	<i>Total</i>
Decision Analysis	IE 412	هـ ص ٤١٢	3	1	-	3
<i>Pre-requisites:</i>	IE 255, IE 331					
<i>Course Role in Curriculum</i>	<i>Required or Elective:</i>		Elective			
<i>Catalogue Description:</i> Principles of decision making under uncertainty. Decision models: influence diagram and decision tree. Solution and analysis of decision problems. Value of information. Attitudes towards risk. Utility theory. Multi-attribute decision problems.						
<i>Textbooks:</i> Clemen,R.T. and Reilly,T. 2001. <i>Making hard decisions with Decision Tools</i> .2 nd edition.Pacific Grove, California: Duxbury Press, 733pp.ISBN10: 0495015083						
<i>Supplemental Materials:</i> DECISION MAKING UNDER UNCERTAINTY: MODELS AND CHOICES, 1979, Charles A. Holloway, Prentice Hall, ISBN 0-13-197749-0						
<i>Course Learning Outcomes:</i> <u>By the completion of the course the student should be able to:</u>						
<ol style="list-style-type: none"> 1. Explain fundamentals of decision analysis with logical and chronological thinking. 2. Model decision problems under uncertainty. 3. Solve decision problems using the roll-back procedure. 4. Identify structure of decision problems. 5. Perform sensitivity analysis of decision problems. 6. Compute the value of perfect and imperfect information. 7. Explain attitudes towards risk. 8. Do projects in decision analysis, and use various computer skills. 9. Work in teams to solve homework problems and do projects. 						
<i>Topics to be Covered:</i>						<u><i>Duration in Weeks</i></u>
1	Introduction to Decision Analysis: Why are decisions hard? Subjective judgments in decision-making, the decision-analysis process, requisite decision models, where is decision analysis used					1
2	Modeling Decisions: Elements of Decision Problems: Values and objectives, making money: a special objective, sequential decisions,					1

	uncertain events, consequences, the time value of money: a special kind of trade-off	
3	Structuring Decisions: Structuring values, structuring decisions: influence diagrams, sequential decisions, intermediate calculations, structuring decisions: decision trees, decision details: defining elements of the decision, defining measurement scales for fundamental objectives	2
4	Making Choices: decision trees and expected monetary value, solving influence diagrams: overview, risk profiles, dominance: an alternative to EMV, making decisions with multiple objectives, assessing trade-off weights	2.5
5	Sensitivity Analysis: one-way sensitivity analysis, Rainbow diagrams, Tornado diagrams, dominance considerations, two-way sensitivity analysis, sensitivity to probabilities, two-way sensitivity analysis for three alternatives	2.5
6	Value of Information: Value of information: some basic ideas, expected value of perfect information, expected value of imperfect information, value of information and experts	2
7	Modelling Preferences: Risk Attitudes: Risk, risk attitudes, expected utility, certainty equivalents, and risk premiums, utility function assessment, risk tolerance and the exponential utility function, decreasing and constant risk aversion	2

Student Outcomes addressed by the course: (Put a ✓ sign)

(a)	an ability to apply knowledge of mathematics, science, and engineering	✓
(b)	an ability to design and conduct experiments, as well as to analyze and interpret data	
(c)	an ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability	
(d)	an ability to function on multidisciplinary teams	
(e)	an ability to identify, formulate, and solve engineering problems	✓
(f)	an understanding of professional and ethical responsibility	
(g)	an ability to communicate effectively	
(h)	the broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context	
(i)	a recognition of the need for, and an ability to engage in life-long learning	
(j)	a knowledge of contemporary issues	✓
(k)	an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.	

Key Student Outcomes assessed in the course: () and ()

Instructor or course coordinator: Dr. Ibrahim Abdulaziz Al-Darrab

Last updated: Jan. 20, 2014