



## **Course Description: Decision Theory**

Syrian Arab Republic	 SVU الجامعة الافتراضية السورية SYRIAN VIRTUAL UNIVERSITY	الجمهورية العربية السورية
Ministry of Higher Education		وزارة التعليم العالي
Syrian Virtual University		الجامعة الافتراضية السورية

## 1. Basic Information:

Course Name	Decision Theory
Course ID	BQM303
Contact Hours (Registered Sessions)	18
Contact Hours (Synchronized Sessions)	18
Mid Term Exam	-
Exam	75 min
Registered Sessions Work Load	18
Synchronized Session Work Load	18
Credit Hours	4

## 2. Pre-Requisites:

Course	ID
Fundamentals of Management	BMN101
Operational Researches	BQM202
Microeconomics	BEC202

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### 3. Course General Objectives:

The purpose of the course is to provide students with fundamental concepts and tools that help them to identify and deal with decision problems in organization, and in other hand, to enlarge their horizon to think innovatively and create new tools and models to solve this type of problems. This can be done by providing students with capabilities and skills to identify decision systems and its components, the relationship with information systems, and other skills to deal with preferences models of the decision maker. Some qualitative and quantitative models to analyze and to solve decision problem will be presented in this course, especially concepts and techniques of the utility theory and decision trees, and other methods in multiple criteria decision making based on binary comparisons.

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#### 4. Intended Learning Outcomes (ILO):

Code	Intended Learning Outcomes
ILO1	Understand basic concepts of the decision problem, bounded rationality, optimality principles, and to differentiate between profit and non-profit decisions.
ILO2	Understand concepts of risk, model, system, and the ability to link between decision and information systems, and Simon's model.
ILO3	Understand the decision process and its components (Alternatives, Criteria).
ILO4	Understand and model the preferences of decision maker, and be able to analyze the basic preferences relations in conform to the different types of decision problematic.
ILO5	Give students necessary orientations to explore decision problem space and the importance of simple models, to be able to apply these models, and to calculate the expected value of the best alternative and estimate the value of information.
ILO6	Understand the concepts of decision trees, and own the ability to apply Bayes theorem and conditional probability.
ILO7	Understand the concepts and techniques of the utility theory, and build a utility function.
ILO8	Give students orientations to explore new concepts of multiple criteria decision models that based on binary comparisons, and to be able to make the matching between election and multiple criteria models.

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## 5. Course Syllabus ( 18 hours of total synchronized sessions;18 hours of total Recorded Sessions)

- RS: Recorded Sessions; SS: Synchronized Sessions;

ILO	Course Syllabus	RS	SS	Type	Additional Notes
ILO1	Basic Concepts in Decision Making: What is a decision? Basic Assumptions. Decision aid. Bounded rationality. Administrative decision.	1.5	1.5	<input type="checkbox"/> Exercises <input checked="" type="checkbox"/> Assignments <input type="checkbox"/> Seminars <input type="checkbox"/> Projects <input type="checkbox"/> Practices <input type="checkbox"/> Others	Historical Annex.
ILO2	Modeling of Managerial problems: Problem's concepts. Risk and System concepts. Modeling concepts. Simon's model.	1.5	1.5	<input type="checkbox"/> Exercises <input checked="" type="checkbox"/> Assignments <input type="checkbox"/> Seminars <input type="checkbox"/> Projects <input type="checkbox"/> Practices <input type="checkbox"/> Others	
ILO3 ILO4	Decision Making Process (Alternatives & Criteria): Decision making process. Decision Problem Definition. Alternatives set. Criteria set. Relative weights of criteria.	3	3	<input type="checkbox"/> Exercises <input checked="" type="checkbox"/> Assignments <input type="checkbox"/> Seminars <input type="checkbox"/> Projects <input type="checkbox"/> Practices <input type="checkbox"/> Others	Annex: Guide of contracting decisions of the DoE in the USA.

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<b>ILO4</b> <b>ILO2</b>	Preferences Modeling and Solution: Preferences modeling. Famous models. Classification of decision problems. Categories of solution models and global judgment.	1.5	1.5	<input type="checkbox"/> Exercises <input type="checkbox"/> Assignments <input type="checkbox"/> Seminars <input type="checkbox"/> Projects <input type="checkbox"/> Practices <input type="checkbox"/> Others	
	<b>ILO5</b>	Simple Models for Decision Making: Equal Likelihood Model. Pessimistic Model (MaxMin). MinMax Model. Pros and Cons Analysis. Lexicographic Model. Conjunctive and Disjunctive Models. Expected Value Model.	3	3	<input checked="" type="checkbox"/> Exercises <input checked="" type="checkbox"/> Assignments <input type="checkbox"/> Seminars <input type="checkbox"/> Projects <input type="checkbox"/> Practices <input type="checkbox"/> Others
<b>ILO6</b>	Decision Trees: Decision tree definitions. Conditional probability and Bayes Theorem. Case: international mark. Some orientations.	1.5	1.5	<input checked="" type="checkbox"/> Exercises <input checked="" type="checkbox"/> Assignments <input type="checkbox"/> Seminars <input type="checkbox"/> Projects <input type="checkbox"/> Practices <input type="checkbox"/> Others	Read solved exercises before session.

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<b>ILO7</b> <b>ILO3</b>	Utility Theory: Problem treated with utility theory. Basic Assumptions. Utility function. Case: Site selection of a nuclear plant. Critics of mono-criterion models.	3	3	<input type="checkbox"/> Exercises <input checked="" type="checkbox"/> Assignments <input type="checkbox"/> Seminars <input type="checkbox"/> Projects <input type="checkbox"/> Practices <input type="checkbox"/> Others	Read the case before session.
<b>ILO8</b> <b>ILO3</b>	Introduction to Multiple Criteria Models: Pareto Optimum & Dominance. Election Models. Outranking Relation. Concordance & Discordance Concepts. ELECTRE III Method. Application of multiple criteria models.	3	3	<input checked="" type="checkbox"/> Exercises <input checked="" type="checkbox"/> Assignments <input type="checkbox"/> Seminars <input type="checkbox"/> Projects <input type="checkbox"/> Practices <input type="checkbox"/> Others	Read the application before session.

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## 6. Assessment Criteria (Related to ILOs)

ISC	Interactive Synchronized Collaboration	Ex	Exams	Rpt	Reports
PF2F	Presentations and Face-to-Face Assessments	PW	Practice Work		

ILO Code	ILO	Intended Results	Assessment Type				
			ISC	PW	Ex	PF2F	Rpt
ILO1	Understand basic concepts of the decision problem, bounded rationality, optimality principles, and to differentiate between profit and non-profit decisions.		X		X		
ILO2	Understand concepts of risk, model, system, and the ability to link between decision and information systems, and Simon's model.		X		X		
ILO3	Understand the decision process and its components (Alternatives, Criteria).		X		X		

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<b>ILO4</b>	Understand and model the preferences of decision maker, and be able to analyze the basic preferences relations in conform to the different types of decision problematic.		X		X		
<b>ILO5</b>	Give students necessary orientations to explore decision problem space, and the importance of simple models, and to be able to apply these models, and to calculate the expected value of the best alternative and estimate the value of information.		X	X	X		
<b>ILO6</b>	Understand the concepts of decision trees, and own the ability to apply Bayes theorem an conditional probability.		X	X	X		
<b>ILO7</b>	Understand the concepts and techniques of the utility theory, and build a utility function.		X	X	X		X

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<b>ILO8</b>	Give students orientations to explore new concepts of multiple criteria decision models that based on binary comparisons, and to be able making the matching between election and multiple criteria models.						
			X	X	X		

## 7. Practice Tools:

Tool Name	Description

## 8. Main References

1. Keeny R. & Raiffa, H. (1976). Decision with Multiple Objectives: Preferences and Value Tradeoffs. John Wiley, New York.
2. Roy B. (1996). Multicriteria Methodology for Decision Aiding. Kluwer Academic Publishers. The Netherlands.

## 9. Additional References

1. Bouyssou, D., Marchant, Th., Pirlot, M, Tsoukias, A., & Vincke, Ph. 2006. Evaluation and Decision Models with Multiple Criteria Stepping Stones for the Analyst. LAMSADE, Université Paris–Dauphine, France.
2. Other Articles for each chapter.