



Course Specification

Course Name: [Statistical Analysis for Decision Making]

Course Code: DS461

I. Basic Course Information

Major or minor element of program: [Major]

Department offering the course: Operations Research and Decision Support Department

Academic level: 400 Level

Semester in which course is offered: [First (fall) Semester]

Course pre-requisite(s): [DS211 Introduction to Decision Support and Systems
And ST122 Probability and Statistics - 2]

Credit Hours: 3

Contact Hours Through:

Lecture	Tutorial*	Practical*	Total
2.5	0.0	1.5	4.0

* 1.5 hours for **either** Tutorial or Practical

Approval date of course specification: September 2014

II. Overall Aims of Course

[The amount of data collected from or about individuals, communities, and institutions has increased rapidly in recent years, and these data are increasingly being used to make major decisions regarding people's health, education, employment, environment and other aspects of social welfare. This course explores the use of statistical methods as analytical tools for understanding and analyzing business problems and for supporting business decision-making. Topics will include revision of descriptive statistics, estimation and hypothesis testing, the analysis of categorical data, then further investigation of correlation and regression, analysis of variance, forecasting techniques for time series data, and ARIMA. The course will emphasize decision-making based on statistics. To do well in this class, students must learn to apply the statistical procedures. That is, when faced with a problem or question they must know which procedure to use, must be able to use it correctly, must be able to draw the correct conclusions from the results, and must be able to report the results accurately and clearly.

In particular, you will:

- Formulate one or more policy or research questions to address.
- Explore your data (using descriptive statistics) and identify limitations of your data, refining your research question(s) if needed.
- Specify hypotheses that you will test empirically.
- Identify statistical methods appropriate for your data and analysis.
- Specify statistical models to test.
- Conduct sensitivity analyses (if appropriate) of alternative model specifications.
- Interpret the results of your statistical analyses in terms of the research questions and hypotheses you defined at the onset of the study.]



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III. Program ILOs covered by course

Program Intended Learning Outcomes (By Code)			
Knowledge & Understanding	Intellectual Skills	Professional Skills	General Skills
[K14,K16,K19]	[I11,I14]	[P12,P15]	[G1,G5,G9]

IV. Intended Learning Outcomes of Course (ILOs)

a. Knowledge and Understanding

On completing the course, students should be able to:

- K.1 Distinguish between different types of data, i.e. cross-sectional, time series, and categorical.
- K.2 Explain the concepts and statistical techniques used to analyze business data.
- K.3 Define and detect trend and seasonality in time-series data.
- K.4 List advantages, disadvantages, and areas of application for the different techniques.
- K.5 Explain the complex, dynamic, and multidimensional issues and perspectives involved in statistical analyses of business situations.

b. Intellectual/Cognitive Skills

On completing the course, students should be able to:

- I.1 Use the essential tools of applied statistics, including data analysis, basic probability, probability models (distributions), sampling theory, point and confidence interval estimation, hypothesis testing, analysis of variance, linear regression and correlation, multiple regression, and time-series forecasting techniques.
- I.2 Use statistical analysis as decision support in all areas of business; customer service, production operations management, and quality control.
- I.3 Apply quantitative analysis to the problems found in managing a business, government, or non-profit organization (production or service oriented).
- I.4 Solve for any real-life problems using appropriate statistical techniques.

c. Practical/Professional Skills

On completing the course, students should be able to:

- P.1 Apply statistical methodology properly in their future academic and professional careers.
- P.2 Use of statistical packages to solve different problems.

d. General and Transferable Skills

On completing the course, students should be able to:

- G.1 Employ critical thinking and independent problem-solving skills.
- G.2 Handle the discomfort of learning something new, formulate questions, and discover plausible answers--all independently or with increasing self-reliance.
- G.3 Infer the physical meaning of the computed statistics and numbers, and being able to interpret them.
- G.4 Appreciate the power of numbers and how numbers serve decision making.
- G.5 Think logically and work systematically.



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V. Course Matrix Contents

	Main Topics / Chapters	Duration (Weeks)	Course ILOs Covered by Topic (By ILO Code)			
			K & U	I.S.	P.S.	G.S.
1-	[Introduction to Course; Data Collection; Types of Data, Presenting Data in Tables and Charts; Excel]	[1]	[K1]	[]	[]	[G1]
2-	[Revision of descriptive statistics]	[1]	[K1,K2]	[]	[]	[G2]
3-	[Revision of estimation and hypothesis testing]	[1]	[K3]	[I1,I2]	[]	[]
4-	[Two-way and Multiple ANOVA]	[2]	[]	[]	[P1]	[]
5-	[Relations Between Two Variables: Covariance & Correlation]	[1]	[]	[I3]	[P2]	[G2]
6-	Multiple Regression	2				G3
7-	Overview of forecasting, Forecasting Taxonomies, Forecasting process	1				
8-	Pattern Analysis: What, Why & How?	1	K4			
9-	Time-Series Decomposition	1		I4		G4
10-	Exponential Smoothing Techniques	1	K5			
11-	Auto-regressive Integrated Moving Average (ARIMA) with Regression	1			P2	G5
	Net Teaching Weeks	13				

VI. Course Weekly Detailed Topics / hours / ILOs

Week No.	Sub-Topics	Total Hours	Contact Hours	
			Theoretical Hours	Practical Hours*
1	[Introduction to Course; Data Collection; Types of Data, Presenting Data in Tables and Charts; Excel]	[2.5]	[2.5]	
2	[Revision of descriptive statistics]	[4]	[2.5]	[1.5]
3	[Revision of estimation and hypothesis testing]	[4]	[2.5]	[1.5]
4	[Two-way and Multiple ANOVA]	[4]	[2.5]	[1.5]
5	[Two-way and Multiple ANOVA]	[4]	[2.5]	[1.5]
6	[Relations Between Two Variables: Covariance & Correlation]	[4]	[2.5]	[1.5]
7	Midterm Exam			



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8	Multiple Regression	4	2.5	1.5
9	Multiple Regression	4	2.5	1.5
10	Overview of forecasting, Forecasting Taxonomies, Forecasting process	4	2.5	1.5
11	Pattern Analysis: What, Why & How?	4	2.5	1.5
12	Time-Series Decomposition	4	2.5	1.5
13	Exponential Smoothing Techniques	4	2.5	1.5
14	Auto-regressive Integrated Moving Average (ARIMA) with Regression	4	2.5	1.5
15	Final Exam			
Total Teaching Hours		51	33	18

* No Practical/Tutorial during the first week of the semester

VII. Teaching and Learning Methods

Teaching/Learning Method	Selected Method	Course ILOs Covered by Method (By ILO Code)			
		K & U	Intellectual Skills	Professional Skills	General Skills
Lectures & Seminars	*	All	All	All	All
Tutorials	*	K1,K2,K3			G1,G2
Computer lab Sessions	*	K1,K2,K3			G1,G2
Practical lab Work					
Reading Materials	*	K4,K5	All	P1,P2	
Web-site Searches					
Research & Reporting					
Problem Solving / Problem-based Learning					
Projects					
Independent Work	*		All	P1,P2	G3,G4,G5
Group Work					
Case Studies	*		I1,I2,I3	All	G1,G2
Presentations					
Simulation Analysis					
Others (Specify):					



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VIII. Assessment Methods, Schedule and Grade Distribution

Assessment Method	Selected Method	Course ILOs Covered by Method (By ILO Code)				Assessment Weight / Percentage	Week No.
		K & U	I.S.	P.S.	G.S.		
Midterm Exam	*	All	All	All	All	20%	7
Final Exam	*	All	All	All	All	60%	14
Quizzes	*	All	All	All	All	5%	4,10
Course Work	*	All	All	All	All	10%	10
Report Writing							
Case Study Analysis	[*]	[All]	[All]	[All]	[All]	[5%]	[5,11]
Oral Presentations							
Practical							
Group Project							
Individual Project							
Others (Specify):							

IX. List of References

Essential Text Books	<ul style="list-style-type: none"> • [Makridakis S., S. Wheelwright, & R. Hyndman (1997), <i>Forecasting: Methods and Applications</i>, J. Wiley & Sons. • Armstrong, J. Scott, ed. (2001), <i>Principles of Forecasting</i>. The book is designed to summarize principles. • Diebold, F.X. (2001), <i>Elements of Forecasting</i>, 2nd ed. Cincinnati: Southwestern College Publishing.]
Course notes	<ul style="list-style-type: none"> • [None]
Recommended books	<ul style="list-style-type: none"> • [Ott, R. Lyman, and Longnecker, Michael T., "A First Course in Statistical Methods," Brooks/Cole - a division of Thomson Learning Inc., California, 2004. • Levenbach, Hans & James P. Cleary (2005), <i>Forecasting: Practice and Process for Demand Management</i>, Belmont, CA: Thomson Brooks/Cole. • Wilson, J. H., B. Keating, & John Galt Solutions, Inc. (2002), <i>Business Forecasting</i>, 4th ed., Boston: McGraw Hill.]
Periodicals, Web sites	<ul style="list-style-type: none"> • [Different search engines]

X. Facilities required for teaching and learning

<ul style="list-style-type: none"> • [Whiteboard] • Datashow • Computer lab]
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Course coordinator: Ass. Prof. Ihab El-Khodary

Head of Department:[Prof. Mohamed Mostafa Saleh]

Date: September 2014