



## Course Specification

**Course Name:**[Probability and Statistics – 2 ]

**Course Code:**ST122

### I. Basic Course Information

Major or minor element of program:General

Department offering the course:[Faculty ]

Academic level:[100 Level]

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

Course pre-requisite(s): [Probability and Statistics – 1 ]

Credit Hours:3

Contact Hours Through:

Lecture	Tutorial*	Practical*	Total
2.5	1.5	0.0	4.0

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

Approval date of course specification:September 2014

### II. Overall Aims of Course

Statistical techniques are put to use in one form or another in almost all branches of modern science and in many other fields of human activity as well. For example, one might be asked either to evaluate published numerical facts, to interpret the results of sampling (surveys or experimentation), or to employ statistical methods to make inferences on his/her work. Also, the increasing availability of computers and statistical software packages has enlarged the role of statistics as a tool for empirical research. Thus, for people involved in science, research, business, and industry, there is a need for them to know the basic concepts, strengths, and limitations of statistics. Accordingly, university students in almost all disciplines, including computer science, are required to take at least one statistics course.

Therefore, this course is intended to introduce students to the basic concepts of study design, data collection, data analysis and statistical reference. The course starts by giving an overview of observational and experimental study designs including the concept of sampling and sampling techniques. Then it proceeds to explain descriptive statistics, i.e. how to present the data in terms of tables and charts, or summarizing the data through a number of descriptive measures for either ungrouped or grouped data. Sampling distributions for a number of the sample statistics are then presented, which will then be employed in statistical inference. Statistical inference is concerned with the formulation and generalizations to population parameters from sample statistics (e.g. interval estimation and hypothesis testing), as well as the prediction and estimation of relationships between two or more variables (e.g. regression).



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#### III. Program ILOs covered by course

Program Intended Learning Outcomes (By Code)			
Knowledge & Understanding	Intellectual Skills	Professional Skills	General Skills
[K13,K14 ]	[I5 ]	[P8 ]	[G5,G9 ]

#### IV. Intended Learning Outcomes of Course (ILOs)

##### a. Knowledge and Understanding

- K.1 Recognize the importance of making use of the knowledge of the probability of the sampling statistics in order to reasonably use sample measures to learn about unknown population parameters.
- K.2 Define descriptive statistics and inference statistics.
- K.3 Explain different sampling procedures.
- K.4 Define the concept of sampling distributions and match the appropriate sampling distribution for different sample statistics.
- K.5 List different types of continuous distributions, and the basic characteristics and uses of the normal distribution.
- K.6 List and explain criteria for selecting sample statistics for estimating population parameters.]

##### b. Intellectual/Cognitive Skills

- I.1 Differentiate between a population and a sample, and consequently the difference between population parameters and sample statistics.
- I.2 Organize and display data using tables and graphs.
- I.3 Distinguish the appropriate population distribution for a particular sample data.
- I.4 Analyze and summarize data (ungrouped and grouped) through descriptive statistics (measures of central tendency, measures of dispersion, and measures of position).
- I.5 Calculate the point and interval estimates for single population and two populations parameters in terms of means, variances, and proportions.
- I.6 Formulate and test the hypotheses for single sample and two samples in terms of means, variances, and proportions.
- I.7 Compare the means and differences among the means for more than two populations through the single factor analysis of variance (ANOVA).
- I.8 Infer about how changes in one variable are related to changes in another set of variables through regression analysis and the correlation analysis. ]

##### c. Practical/Professional Skills

- P.1 Evaluate the results to determine if the results and numbers logical or not.
- P.2 Apply statistical techniques to any real practical problem in different fields and applications.
- P.3 Use the statistical tables. ]

##### d. General and Transferable Skills

- G.1 Infer the physical meaning of the computed statistics and numbers, and being able to interpret them to help in decision making.
- G.2 Acquire problem-solving skills. ]



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V. Course MatrixContents

	Main Topics / Chapters	Duration (Weeks)	Course ILOs Covered by Topic (By ILO Code)			
			K & U	I.S.	P.S.	G.S.
1-	Introduction	[3]	[K1,K2,K3]	[I1,I2]	[P1]	[ ]
2-	Continuous probability distributions.	[2]	[K4,K5,K6]	[I1,I3,I4]	[All]	[ ]
3-	Point and interval estimates	[3]	[K5,K6]	[I1,I3,I5]	[All]	[All]
4-	Hypothesis testing	[2]	[ ]	[I6]	[All]	[All]
5-	Single-factor analysis of variance and comparative analysis of treatments	[1]	[ ]	[I7]	[All]	[All]
6-	Regression and correlation analysis	[2]	[ ]	[I8]	[All]	[All]
	<b>Net Teaching Weeks</b>	<b>13</b>				

VI. Course Weekly Detailed Topics / hours / ILOs

Week No.	Sub-Topics	Total Hours	Contact Hours	
			Theoretical Hours	Practical Hours*
1	[Introduction: What is statistics?, Types of statistics, Population versus sample, Basic terms, etc ...]	[2.5]	[2.5]	
2	[Organizing data]	[4]	[2.5]	[1.5]
3	[Revision of numerical descriptive measures for populations and samples, for ungrouped and grouped data: Measures of Central Tendency, Measures of Dispersion, And Measures of Position.]	[4]	[2.5]	[1.5]
4	[Continuous probability distributions and the normal distribution]	[4]	[2.5]	[1.5]
5	[Sampling distributions for the sample means (the normal and student t-distribution), the sample proportions (the normal distribution), and the sample variances (the Chi-square and F distributions)]	[4]	[2.5]	[1.5]
6	[Point and interval estimates for the means, proportions, and variance for single populations]	[4]	[2.5]	[1.5]
7	<b>Midterm Exam</b>			



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8	[ Point and interval estimates for the means, proportions, and variance for single populations. - Point and interval estimates for the difference in means and proportions, and the ratio of variances of two populations ]	[ 4 ]	[ 2.5 ]	[ 1.5 ]
9	[ Point and interval estimates for the difference in means and proportions, and the ratio of variances of two populations ]	[ 4 ]	[ 2.5 ]	[ 1.5 ]
10	Hypothesis testing	[ 4 ]	[ 2.5 ]	[ 1.5 ]
11	Hypothesis testing	[ 4 ]	[ 2.5 ]	[ 1.5 ]
12	[ Single-factor analysis of variance and comparative analysis of treatments ]	[ 4 ]	[ 2.5 ]	[ 1.5 ]
13	Regression and correlation analysis	[ 4 ]	[ 2.5 ]	[ 1.5 ]
14	Regression and correlation analysis	[ 4 ]	[ 2.5 ]	[ 1.5 ]
15	<b>Final Exam</b>			
<b>Total Teaching Hours</b>		<b>51</b>	<b>33</b>	<b>18</b>

\* 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	[]
Tutorials	√	All	All	All	[]
Computer lab Sessions	[]	[]	[]	[]	[]
Practical lab Work	[]	[]	[]	[]	[]
Reading Materials	[]	[]	[]	[]	[]
Web-site Searches	[]	[]	[]	[]	[]
Research & Reporting	[]	[]	[]	[]	[]
Problem Solving / Problem-based Learning	[]	[]	[]	[]	[]
Projects	[]	[]	[]	[]	[]
Independent Work	[]	[]	[]	[]	[]
Group Work	[]	[]	[]	[]	[]
Case Studies	√	[]	[]	[P1,P2]	[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	√	K1 – K4	I1 – I4	P1,P2,P3	G1,G2	20%	7
Final Exam	√	All	All	P1,P3	G1,G2	60%	15
Quizzes	√	All	All	All	G2	5%	4, 9
Course Work	√	All	All	All	All	15%	Bi-Weekly
Report Writing							
Case Study Analysis							
Oral Presentations							
Practical							
Group Project							
Individual Project							
Others (Specify):							

IX. List of References

<b>Essential Text Books</b>	<ul style="list-style-type: none"> <li>Ott, R. Lyman, and Longnecker, Michael T., "A First Course in Statistical Methods," Brooks/Cole - a division of Thomson Learning Inc., California, 2004.</li> <li>Lapin, Lawrence L., "Probability and Statistics for Modern Engineering," PWS-Kent Publishing Company, Boston, 1990</li> </ul>
<b>Course notes</b>	<ul style="list-style-type: none"> <li>None</li> </ul>
<b>Recommended books</b>	<ul style="list-style-type: none"> <li>None</li> </ul>
<b>Periodicals, Web sites, etc ...</b>	<ul style="list-style-type: none"> <li>None</li> </ul>

X. Facilities required for teaching and learning

<ul style="list-style-type: none"> <li>None</li> </ul>
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Course coordinator: [Ass. Prof. Ihab El Khodary]

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Vice Dean for Education and Student affairs

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