Advanced Diploma in Management (891) – Business Statistics

Prerequisites: Knowledge of management terminology.	**Corequisites:** A pass or higher in Diploma in Management or equivalence.

Aim: Statistical methods used in business research, analysis and decision making; preparation and presentation of data, frequency distributions, measures of central tendency and dispersion, statistical inference, regression and correlation. This course is an applications-oriented study of statistical concepts and techniques. The course focuses on the candidate as a user of statistics who needs a minimal understanding of mathematical theory and formula derivation. Major topics of study are visualizing data, central tendency, dispersion, distributional shapes, sampling distributions, confidence intervals, discrete and continuous probability distributions, comparison tests, association tests, and regression. The objectives of the course are to develop the skill to apply these concepts in conjunction with computer usage and make appropriate decisions regarding actual business problems.

Required Materials: Recommended Learning Resources.	**Supplementary Materials:** Lecture notes and tutor extra reading recommendations.

Special Requirements: The course requires practical use of Excel software.

Intended Learning Outcomes:	Assessment Criteria:	
1 Distinguish between qualitative and quantitative data.	1.1	Describe nominal, ordinal, interval, and ratio scales of measurement.
	1.2	Describe the difference between a population and a sample.
	1.3	Be able to calculate and interpret percentiles and quartiles.
	1.4	Explain measures of central tendency and how to compute them.
	1.5	Be able to create different types of charts that describe data sets.
	1.6	Be able to use Excel to compute various measures and create charts.
2 Define probability, sample space, and event.	2.1	Distinguish between subjective and objective probability.
	2.2	Describe the complement of an event and the intersection and union of two events.
	2.3	Be able to compute probabilities of various types of events.
	2.4	Explain the concept of conditional probability and how to compute it.
	2.5	Describe permutation and combination and their use in certain probability computations.
	2.6	Explain Bayes' theorem and its application.
3 Distinguish between discrete and continuous random variables.	3.1	Explain how a random variable is characterized by its probability distribution.
	3.2	Be able to compute statistics about a random variable.
	3.3	Be able to compute statistics about a function of a random variable.
	3.4	Be able to compute statistics about the sum of a linear composite of random variables.

		3.5	Be able to solve problems involving standard distributions manually using formulas.
		3.6	Be able to solve business problems involving standard distributions using spreadsheet.
4	Identify when a random variable will be normally distributed.	4.1	Be able to use the properties of the normal distribution.
		4.2	Explain the significance of the standard normal distribution.
		4.3	Compute probabilities using normal distribution tables.
		4.4	Transform a normal distribution into a standard normal distribution.
		4.5	Be able to convert a binomial distribution into an approximated normal distribution.
5	Understand how to take random samples from populations. Explain the need to compare two population parameters.	5.1	Distinguish between population parameters and sample statistics.
		5.2	Be able to apply the central limit theorem.
		5.3	Derive sampling distributions of sample means and proportions.
		5.4	Explain why sample statistics are good estimators of population parameters.
		5.5	Identify special sampling methods.
		5.6	Be able to conduct a paired-difference test for difference in population means.
		5.7	Be able to conduct an independent-samples test for difference in population means.
		5.8	Describe why a paired-difference test is better than an independent-samples test.
		5.9	Be able to conduct a test for difference in population proportions.
		5.10	Test whether two population variances are equal.
6	Understand confidence intervals.	6.1	Be able to compute confidence intervals for population means.
		6.2	Be able to compute confidence intervals for population proportions.
		6.3	Be able to compute confidence intervals for population variances.
		6.4	Be able to compute minimum sample sizes needed for an estimation.
		6.5	Be able to compute confidence intervals for special types of sampling methods.
7	Explain why hypothesis testing is important.	7.1	Describe the role of sampling in hypothesis testing.
		7.2	Identify type I and type II errors and discuss how they conflict with each other.
		7.3	Interpret the confidence level, the significance level, and the power of a test.
		7.4	Be able to compute and interpret p-values.
		7.5	Determine the sample size and significance level for a given hypothesis

			test.
8	Explain the purpose of analysis of variance (ANOVA).	8.1	Describe the model and computations behind ANOVA.
		8.2	Explain the test statistic F.
		8.3	Conduct a one-way ANOVA.
		8.4	Conduct a two-way ANOVA.
9	Determine whether a regression experiment would be useful in a given instance.	9.1	Formulate a regression model.
		9.2	Be able to compute a regression equation.
		9.3	Be able to compute the covariance and the correlation coefficient of two random variables.
		9.4	Be able to compute confidence intervals for regression coefficients.
		9.5	Be able to compute a prediction interval for a dependent variable.
10	Determine whether multiple regression would be applicable to a given instance.	10.1	Be able to formulate a multiple regression model.
		10.2	Be able to test the validity of a multiple regression by analyzing residuals.
		10.3	Be able to carry out hypothesis tests about the regression coefficients.
		10.4	Be able to compute a prediction interval for the dependent variable.
		10.5	Be able to use indicator variables in a multiple regression.
		10.6	Be able to carry out a polynomial regression.
		10.7	Determine which independent variables are to be included in a multiple regression model.
11	Differentiate between qualitative and quantitative methods of forecasting.	11.1	Be able to carry out a trend analysis in time series data.
		11.2	Identify seasonal and cyclical patterns in time series data.
		11.3	Be able to forecast using simple and weighted moving-average methods.
		11.4	Be able to forecast using the exponential smoothing method.
		11.5	Be able to forecast when the time series contains both trend and seasonality.
		11.6	Be able to assess the efficiency of forecasting methods using measures of error.
12	Determine when to use control charts.	12.1	Be able to create control charts for sample means, ranges, and standard deviations.
		12.2	Be able to create control charts for sample proportions.
		12.3	Be able to create control charts for a number of defectives.
		12.4	Be able to draw Pareto charts using spreadsheets.
		12.5	Be able to draw control charts using spreadsheets.
13	Differentiate between parametric and nonparametric tests.	13.1	Be able to conduct a sign test to compare population means.

	13.2	Be able to conduct a runs test to detect abnormal sequences.
	13.3	Be able to conduct a Mann-Whitney test for comparing population distributions.
	13.4	Be able to conduct a Wilcoxon test for paired differences.
	13.5	Be able to conduct a Friedman test for randomised block designs.
	13.6	Be able to compute Spearman's rank correlation coefficient for ordinal data.
	13.7	Be able to conduct a chi-square test for goodness of fit.
	13.8	Be able to conduct a chi-square test for independence.
	13.9	Be able to conduct a chi-square test for equality of proportions.

Recommended Learning Resources: Business Statistics

Text Books	• Business Statistics: A Complete One Semester Course by Sonia Taylor. ISBN-10: 0333794451 • Complete Business Statistics with Student CD by Amir D Aczel. ISBN-10: 0071244166 • Basic Business Statistics: Concepts and Applications by Mark L Berenson , David M. Levine , Timothy C. Krehbiel. ISBN-10: 0135009367 • Business Statistics in Practice w/Student CD by Bruce L Bowerman , Richard T O'Connell. ISBN-10: 007128091X
Study Manuals	BCE produced study packs
CD ROM	Power-point slides
Software	None