*General Certificate of Education ( Advanced Level )*

# *BUSINESS STATISTICS SYLLABUS*

*Grades 12 and 13*


*Department of Business Studies*

*Faculty of Science and Technology*

*National Institute of Education.*

## 1.0 Introduction

Each and every individual and organization has to lake various decisions in achieving their targets and objectives. These objectives could be achieved successfully only through optimal decisions. Statistics is very important being a collection of decision making techniques facing risk and uncertainty. The prospective world could be more successful based on the effective decisions made by the children who are ready to undertake that responsibility.

The business field being a major force of the social development plays a vital role. The subject Business Statistics enriched with many scientific decision making techniques was introduced based on the social requirement of optimal utilization of scarce and limited resources.

Numerous individuals, who join the labour force after failing their G.C.E. (A/L), engage in some self employment project. Some of the students who get through A/L have the chance of continuing higher education in foreign universities. Many of the students after A/L - follow various professional educational courses. It is an obvious fact that many of these professional courses are related to the management field. Statistics is included in these universally accepted courses such as Technical College Diploma, University Degrees and Diplomas, AAT, SLICA, CIMA, CIM, CMA. ACCA and ABE etc. Therefore, learning "Business Statistics would be very important." for the betterment of the students' future.

The teaching- learning process of many countries is revised in relation to the new world trends. This teacher information Manual (TIM) has also been prepared under the \educational reforms implemented from 2009. This can be utilized for the purpose of preparing the Sri Lanka labour force to contribute effectively at national level as well as at international level by developing the education making skills of A/L students through a classroom level teaching - learning process.

## 2.0 Objectives of the subject

- Behaves having understood the broad business environment.
- Makes optimal decisions related to the functions of business activities.
- Derives useful information from the data created in business functions and utilizes the resources available in a more efficient manner.
- Generalizes the population through sample analysis.
- Forecasts future trends through the analysis of the prevailing situation.
- Motivates oneself towards research and development affairs in the business field.

| | | ***Proposed guideline according to the school terms.*** |
|---|---|---|
| **Grade** | **Term** | **Competencies and competency levels** |
| **Grade 12** | First term | Competency level 1.1 to competency level 2.8 ( 10 competency levels ) |
| | Second term | Competency level 3.1 to competency level 4.9 ( 14 competency levels ) |
| **Grade 13** | Third term | Competency level 5.1 to competency level 5.15 ( 15 competency levels ) |
| | First term | Competency level 6.1 to competency level 6.10 (10 competency levels ) |
| | Second term | Competency level 6.11 to competency level 7.10 ( 16 competency levels) |
| | Third term | Competency level 8.1 to competency level 9.7 ( 11 competency levels) |

## *3.0 Syllabus*

## *3.1 Grade 12*

### *Competencies, competency levels, subject content and periods.*

| Competency | Competency levels | Subject content | Periods |
|---|---|---|---|
| **1.0 Explores the scope of Business Statistics and its nature.** | | | **10** |
| | 1.1 Reviews Business Statistics and its Limitations. | • Objectives and limitations of the subject Business Statistics<br>• Definitions of "Statistics"<br>• Classifications of statistics<br>  • Descriptive statistics<br>  • Inferential statistics<br>• Role of statistics<br>• Importance of statistics.<br>• Limitations of statistics | 04 |
| | 1.2 Analyses the contribution of statistics in the field of business. | • Nature and contribution of statistics in the field of business<br>• Usage of Business Statistics.<br>  • Market survey.<br>  • New trends and forecasting.<br>  • Planning and Quality control<br>  • Costing and Auditing<br>  • Human Resource Management | 06 |

| Competency | Competency levels | Subject Content | Periods |
|---|---|---|---|
| **2. Communicates Business Information.** | 2.1 Collects data utlizing various sources. | • Types of data<br>  • Qualitative data<br>  • Quantitative data<br>  • Internal data<br>  • External data<br>  • Primary data<br>  • Secondary data<br>• Population and Sample<br>• Sources of data<br>• Methods of data collection<br>• Instruments used in data collection<br>• Advantages and disadvantages of data collecting methods | 15 |
| | 2.2 Organizes Business Data. | • Organized data<br>  • Tabulation of data<br>  • Stem & leaf diagram | 15 |

| Competency | Competency levels | Subject Content | Periods |
|---|---|---|---|
| | | • Frequency Distribution<br>  • Ungrouped frequency distribution<br>  • Grouped frequency distribution<br>  • Cumulative frequency distribution<br>  • Relative frequency distribution<br>  • Relative cumulative frequency distribution. | |
| | 2.3 Communicates business data using Bar- charts and pictograms | • Presentation of Business Data<br>  • Simple bar- charts<br>  • Component bar- charts<br>  • Multiple bar- charts<br>  • Pictograms | 08 |
| | 2.4 Communicates Business data using pie- charts and profile charts. | • Pie-charts<br>• Profile charts | 04 |
| | 2.5 Presents Business Data using linear graphs | • Graphs<br>  • Linear graphs | 04 |

| Competency | Competency levels | Subject Content | Periods |
|---|---|---|---|
| | 2.6 Depicts frequency distributions graphically. | • Histogram & Frequency polygon<br>• Ogive curve | 06 |
| | 2.7 Presents business data using the Lorenz Curve. | • Lorenz Curve<br>• Construction of the Lorenz Curve<br>• Interpret of the Lorenz Curve | 04 |
| | 2.8 Uses the Z- chart to present business data. | • Z- chart<br>• Construction of the Z- chart<br>• Clarification of its importance | 04 |

| Competency | Competency levels | Subject Content | Periods |
|---|---|---|---|
| **3. Analyses Business Data** | | | **60** |
| | 3.1 Analyses business data using measures of central tendency Mean, Median and Mode. | • Measures of central tendency<br>  • Mean<br>  • Median<br>  • Mode | 14 |
| | 3.2 Analyses business data using measures of central tendency- Geometric mean, Harmonic mean, Weighted mean. | • Geometric Mean<br>• Harmonic Mean<br>• Weighted Mean | 12 |
| | 3.3 Analyses the position of data using measures of Relative Location. | • Quantiums<br>  • Quartiles<br>  • Deciles<br>  • Percentiles.<br>• Box and whisker plot<br>  • Construction<br>  • Usage | 12 |
| | 3.4 Analyses business data using measures of Dispersion. | • Dispersion in data<br>  • Range<br>  • Inter- quartile deviation<br>  • Mean deviation<br>  • Variance and Standard Deviation<br>  • Co- efficient of variance | 16 |
| | 3.5 Analyses business data using Skeveness and Kurtosis | • Skiveness<br>• Kurtosis | 6 |

| Competency | Competency levels | Subject Content | Periods |
|---|---|---|---|
| **4.Forecasts having explored the relationship between variables.** | | | **30** |
| | 4.1 Determines the types of variables. | • Scatter Diagram<br>• Types of variables<br>  • Independent variables<br>  • Dependent variables | 02 |
| | 4.2 Determines the types of relations observing scatter Diagrams. | • Types of relations<br>  • Positive linear relations<br>  • Negative linear relations<br>  • Non relations | 02 |
| | 4.3 Uses the concept of correlation to analyse the relationship between two variables. | • Concept of correlation<br>  • Introduction<br>  • Usage | 02 |
| | 4.4 Quantifies the Product Moment correlation co-efficient. | • Product Moment correlation coefficient<br>  • Definition<br>  • Calculation | 04 |

| Competency | Competency levels | Subject Content | Periods |
|---|---|---|---|
| | 4.5 Quantifies the Rank correlation coefficient. | • Rank correlation coefficient<br>  • Definition<br>  • Calculation | 04 |
| | 4.6 Uses Free Hand method to fit a regression line. | • Concept of regression<br>  • Free hand method<br>  • Fitting the regression line<br>  • Pointing out the weaknesses of free hand method | 02 |
| | 4.7 Derives regression line using the Least Square method. | • The Least Square method<br>• Deriving the Regression line<br>• Pointing out advantages / disadvantage | 06 |
| | 4.8 Examines the goodness of fit of a regression line derived on the Least Square method. | • Examining the goodness of fit of a least squared regression line<br>  • Coefficient of determination.<br>  • Usage of the coefficient of determination. | 02 |
| | 4.9 Forecasts by matching the relations between variables | • Forecasting<br>  • Interpolation<br>  • Extrapolation | 02 |

| Competency | Competency levels | Subject Content | Periods |
|---|---|---|---|
| **5. Demonstrates preparedness to face business risk.** | | | **140** |
| | 5.1 Analyses the concept of probability using the business uncertainty. | • Events<br>  • Definite events<br>  • Indefinite events (Random events)<br>  • Events that never happen | 03 |
| | 5.2 Differentiates random experiments out of various experiments. | • Experiments<br>  • Certain experiments<br>  • Random experiments | 03 |
| | 5.3 Uses set theory to composite the events depicting members included in the sample space and the event space. | • Sample space<br>• Event space<br>• Single and composite events<br>• Composition of events.<br>  • Union of two events<br>  • Intersection of two events<br>  • Complement of an event<br>  • Difference between two events<br>• Tree Diagrams<br>  • Introduction<br>  • Usage | 10 |

| Competency | Competency levels | Subject Content | Periods |
|---|---|---|---|
| | 5.4 Makes choices from a given set of items/ materials which are different to each other. | • Counting Techniques<br>• Permutations<br>• Combinations | 15 |
| | 5.5 Uses combinations in binomial expansion. | • Binomial Theorem<br>• Binomial expansion<br>• Usage of binomial theorem | 08 |
| | 5.6 Uses the Classical Approach and Subjective Approach to explore "PROBABILITY" | • Approaches to probability<br>• Classical Approach<br>• Subjective Approach | 03 |
| | 5.7 Analyses probability using the Relative Frequency Approach. | • Relative Frequency Approach<br>• Definition<br>• Analyzing business events according to this approach | 03 |
| | | . | |

| Competency | Competency levels | Subject Content | Periods |
|---|---|---|---|
| | 5.8 Analyses probability using the Axiometric Approach | • Axiometric Approach<br>• Additive law | 10 |
| | 5.9 Uses Conditional Probability techniques to compute the business uncertainity. | • Conditional Probability<br>• Multiplicative law<br>• Independence of two events | 10 |
| | 5.10 Uses the Total Probability Law to solve problems related to all the events in the sample space. | • Total Probability Law<br>• Baye's theorem | 10 |
| | 5.11 Derives probability distributions related to random variables. | • Random variables<br>• Discrete random variables<br>• Continuous random variables<br>• Probability Distributions<br>• Expected value<br>• Variance | 12 |

| Competency | Competency levels | Subject Content | Periods |
|---|---|---|---|
| | 5.12 Solves problems related to discrete random variables using the binomial distribution. | • Binomial Distribution<br>• Characteristics of a binomial distribution.<br>• Binomial distribution function.<br>• Mean and variance of a binomial distribution. | 12 |
| | 5.13 Solves problems related to discrete random variables using the Poisson distribution. | • Poisson distribution<br>• Characteristics of a Poisson distribution.<br>• Poisson distribution function.<br>• Mean and variance of a poisson distribution<br>• Poisson approximation for binomial distribution | 12 |
| | 5.14 Explores the characteristics of Normal distribution as a model of continuous variables. | • Normal distribution<br>• Characteristics of a normal distribution<br>• Normal distribution function<br>• Area under Standard Normal Curve | 09 |
| | 5.15 Solves problems related to continuous variables using the Normal distribution. | • Using the standard normal distribution in solving problems related to probability.<br>• Approximation<br>• Normal approximation to the binomial distribution.<br>• Normal approximation to the poisson distribution. | 20 |

| Competency | Competency levels | Subject Content | Periods |
|---|---|---|---|
| **6. Makes business decisions** | | | **180** |
| | 6.1 Uses Inferential Statistics in decision making in the business field. | • Population and Sample<br>• Parameters and Statistics | 06 |
| | 6.2 Uses random sampling . so as to match with the situations. | • Random sampling methods<br>• Simple random sampling<br>• Stratified random sampling<br>• Cluster sampling<br>• Systematic sampling | 16 |
| | 6.3 Chooses representative samples using Non-random sampling methods. | • Nonrandom sampling methods<br>• Quota sampling<br>• Judgement sampling<br>• Easy sampling<br>• Sampling errors<br>• Non- sampling errors | 10 |
| | 6.4 Builds up the sampling distribution of the sample Mean $(\overline{X})$ accurately. | • Sampling distributions<br>• Parameters and statistics<br>• Sampling distribution of sample mean $(\overline{X})$<br>• When the population is normally distributed.<br>• When the population is not normally distributed (Usage of central limit theorem.) | 10 |

| Competency | Competency level | Subject Content | Periods |
|---|---|---|---|
| | 6.5 Builds up the sampling distribution of the difference between two sample means $\left(\overline{X} - \overline{X}\right)$ accurately | • Sampling distribution of the difference between two sample means $\left(\overline{X}_1 - \overline{X}_2\right)$<br>• When the population is normal.<br>• When the population is not normal.<br>(Usage of Central Limit Theorem) | 08 |
| | 6.6 Builds up accurately the sampling distribution of the sample proportion -P | • Sampling Distribution of sample proportion. (P)<br>• Population Proportion and Sample Proportion.<br>• Sampling Distribution of p<br>• When the sample size is large. | 08 |
| | 6.7 Builds up the Sampling Distribution of the difference between two Sample Proportions ($p_1$-$p_2$) accurately. | • Sampling Distribution of $P_1$-$P_2$<br>• Difference between two population proportions.<br>• Difference between two sample proportions.<br>• Distribution of $P_1$-$P_2$<br>• When the sample size is large. | 15 |
| | 6.8 Uses the point estimation in Business decision making. | • Statistical Estimation.<br>• Estimator and Estimate<br>• Point estimation<br>• Properties expected in a good point estimator. | |

| Competency | Competency levels | Subject Content | Periods |
|---|---|---|---|
| | | • Unbiasedness<br>• Efficiency.<br>• Consistency.<br>• Sufficiency. | |
| | 6.9 Uses Interval Estimation in making Business Decisions Related to the population mean. | • Interval Estimation.<br>• Confidance interval and confidance levels.<br>• Confidance interval for population mean ( $\mu$ )<br>• In a normal population of which the population variance $(\sigma^2)$ is known.<br>• In a normal population of which the population variance $(\sigma^2)$ is unknown.<br>• For small size samples (using the -t- distributions.)<br>• For large size samples.<br>(Using the normal distribution) | 15 |

| Competency | Competency levels | Subject Content | Periods |
|---|---|---|---|
| | | • In a non normal population of which the population variance is known.<br>• In a non normal population of which the population variance is unknown. | |
| | 6.10 Uses Interval Estimation in making Business Decisions Related to the difference between the means of two populations. | • Confidance limits for the difference between the Means of two populations.<br>• For the difference between the mean of two normal populations of which the population variances are known.<br>• For the difference between the Means of two non-normal populations of which the population variances are known.<br>• For the difference between the means of two -normal populations of which the population variances are un known.<br>• For difference between the means of two non normal populations of which the population variances are unknown. | 15 |

| Competency | Competency levels | Subject Content | Periods |
|---|---|---|---|
| | | • For the difference between means of two normal populations of which the population variances are unknown, but equal. | |
| | 6.11 Uses Interval Estimation in making Business Decisions Related to the population proportion. | • Interval Estimation for the population proportion $(\pi)$ | 04 |
| | 6.12 Uses Interval Estimations in making business decisions related to the difference between two population proportions. | • Confidance limits for the difference between two population proportions. $(\pi_1 - \pi_2)$ | 09 |
| | 6.13 Explores the process of Statistical Hypothesis Testing. | • Statistical Hypothesis Testing.<br>• For the mean of a normal population of which the variance is known.<br>• For the mean of a normal population of which the variance is unknown. | |

| Competency | Competency levels | Subject Content | Periods |
|---|---|---|---|
| | | • Related to large size samples.<br>• Related to small size samples.<br>• For the mean of any population which is not distributed normally.<br>• Related to the population proportion.<br>• Related to the difference between two population means.<br>• Related to the difference between two population proportions. | |
| | 6.15 Makes Business decisions using Chi-Squared $(\chi^2)$ test. | • Chi-squared $(\chi^2)$ test.<br>• Testing in connection with the independency of a contingency table.<br>• Testing in connection with the goodness of fit. | 12 |

| Competency | Competency levels | Subject Content | Periods |
|---|---|---|---|
| | 6.16 Makes Business Decisions Related to Equality among several populations using the Analysis of Variance Technique. | • One way analysis of variance<br>• F- test<br>• Anova table.( Analysis of Variance table.) | 12 |
| **7.0 Forcastes having explored time depended variables.** | | | **40** |
| | 7.1 Determines movements included in time depended variables. | • Components of Time Series.<br>• Long Term Trend<br>• Seasonal Movements.<br>• Cyclical Movements.<br>• Irregular Movements. | 04 |
| | 7.2: Uses the most appropriate models to separate the movements of Time Series. | • Additive modle.<br>• Multiplicative Modle. | 02 |
| | 7.3 Uses the Free Hand Method to compute the trend. | • Free Hand Method.<br>• Estimating the trend.<br>• Advantages and disadvantages. | 02 |

| Competency | Competency levels | Subject Content | Periods |
|---|---|---|---|
| | 7.4 Uses the semi-average Method to compute the trend. | • Semi-average method.<br>• Estimating the trend.<br>• Advantages and disadvantages. | 02 |
| | 7.5 Computes the Trend of Time Series based on the Least Square Method. | • The Least Square method.<br>• Estimating the trend.<br>• Advantages and disadvantages. | 24 |
| | 7.6 Analyses the nonlinear trend using Moving Average Method. | • Moving Average Method.<br>• Estimating the trend.<br>• Advantages and disadvantages | 64 |
| | 7.7 Uses simple Techniques to compute the seasonal index. | • Average Percentage Method.<br>• Calculating the seasonal Index.<br>• Advantages and disadvantages. | 06 |
| | 7.8 Uses the Moving Average Ratio method to compute seasonal index | • Moving Average Ratio Method.<br>• Calculating the seasonal Index<br>• Advantages and disadvantages. | 06 |

| Competency | Competency levels | Subject Content | Periods |
|---|---|---|---|
| | 7.9 Makes decisions using the deseasonelised time series data. | • Deseasonelised time series<br>• Calculations.<br>• Graphing. | 04 |
| | 7.10 Forecasts using the analysis of the components of Time Series. | • Forecasting.<br>• For an year.<br>• For a month.<br>• For a quarter. | 04 |
| **8.0 Applies statistical techniques in Management Decision making.** | | | **40** |
| | 8.1 Uses statistical techniques to produce goods in high quality and to identify their variations. | • Quality control.<br>• Statistical quality control.<br>• Variations in product.<br>• Allowable (chance) variation.<br>• Assignable ( controllable ) variation. | 08 |
| | 8.2 Uses appropriate techniques to control the variables in product. | • Process control.<br>• Control charts for variable control.<br>• $\overline{X}$ - chart • R-chart | 10 |

| Competency | Competency levels | Subject Content | Periods |
|---|---|---|---|
| | 8.3 Uses appropriate techniques in Attribute Controlling. | • Control charts for Attribute controling.<br>• P-chart<br>• np-chart<br>• C- chart | 10 |
| | 8.4 Uses suitable techniques in Product Controlling. | • Product Control<br>• Acceptance Sampling Techniques.<br>• Stock Level Checking Techniques. | 12 |
| **9.0 Behaves as a Rational Decision Maker.** | | | **40** |
| | 9.1 Builds up the base to study Indices. | • Base year and current year.<br>• Showing the value in current year as a percentage of the value in base year. | 04 |
| | 9.2 Achieves at rational decisions using simple Relative Indices. | • Simple Price Relative.<br>• Simple Quantity Relative .<br>• Simple Value Relative. | 04 |

| Competency | Competency levels | Subject Content | Periods |
|---|---|---|---|
| | 9.3 Makes rational decisions using Simple Aggregated indices. | • Simple Aggregated Price Index.<br>• Simple Aggregated Quantity Index.<br>• Simple Aggregated Value Index. | 04 |
| | 9.4 Makes rational decisions using the Average of Simple Relatives. | • Simple Average Index of Price Relatives.<br>• Simple Average Index of Quantity Relatives.<br>• Simple Average index of Value Relatives. | 04 |
| | 9.5 Makes rational decisions using Weighted Aggregated Indices. | • Weighted Aggregated indices.<br>  • Laspeyer Index.<br>  • Paasche Index.<br>  • Fisher Index.<br>  • Typical Index. | 10 |
| | 9.6 Makes rational decisions using Weighted Average Indices. | • Changing the base year of an Index<br>  • Information required to build up a price index.<br>  • Using indices for deflation<br>  • Calculating a price index.<br>• Calculating of consumer price Indices. | |
| | 9.7 Makes Rational Conclusions using the indices available. | • Consumer price indices<br>  • Whole sale price index.<br>  • Share market price index<br>  • Implicit price index | 02 |

## 4.0 Teaching-Learning Methodology

- It has been designed to organize the teaching-learning process of the Business Statistic subject through a student - centered methodology related to the competencies chosen under the new reforms of the curriculum.

- About 300 periods of the school time table in an year have been allocated for this subject, but this activity based teaching -learning process may requir only about 240 periods.

- Concept performance is expected through practical experiences based on the modern approach.

- Suitable opportunities should have been created to promote the inborn calibre and the creative skills of the students through extra curricular activities in addition to the proposed activities.

## 5.0 Organizing the school policies and programmes

- In order to make the above teaching-Learning methodology a success, the school policies and programmes could be highly supportive. Instances of such school policies and programmes are as follows.

- Statistical techniques could be applied in school management and for the development of the other subjects. Specially many of these techniques could be utilized in individual and group projects of the A/L students. Therefore, suitable programmes should be designed with the assistance of the class teachers and subject teachers with the intervention of the administration.

- Surveys can be implemented related to the school community, school environment and also the business field, and these data collected can be processed with the help of the school computer unit and displayed on the notice board wall newspapers or some other publications if any.

- Design a practical project that can be implemented in the school premisses and carry out a feasibility study. Then present a well prepared plan to the school administration and implement annually.

- Establish committees comprising all the sectors of the school community to popularize the Business Statistics subject among the students teachers and the parents through appropriate practical programmes.

## 6.0 Assessment and Evaluation

- It is expected to implement the creative Teaching-Learning Assessing instruments related to the competencies and competency levels allocated to each school term under the SBA programme.

- This syllabus is recommended for the G.C.E (A/L ) Examination which is the National Level Evaluation at the end of the year 13. The National Level Examination based on this syllabus will be held for the first time in the year 2011 by the Department of Examinations in Sri Lanka. The necessary particulars in connection with the nature of the exam and the model question papers will be furnished by the Departmant of Examinations in the due time.