

# BSc (Hons) Business Statistics with Economics – SH305

## 1.Objectives

This programme is designed to produce a class of business professionals conversant with rigorous statistical and quantitative techniques and able to apply their power in the business environment. Students will be trained in the analysis of data to evaluate risks and extract business intelligence that can give businesses a competitive edge in an increasingly tight playing field. This programme will pay special attention to the economic function of businesses.

## 2.General Entry Requirements

In accordance with the University General Entry Requirements for admission to undergraduate degree Programmes.

## 3.Programme Requirements

Credit in English at SC/GCE 'O' Level **and**

Passes in two "A" level subjects including Mathematics - Preference will be given to applicants having at least a "B" in Mathematics

## 4.Programme Duration

	<b>Normal</b>	<b>Maximum</b>
Degree	3 Years	5 Years

## 5.Credits per Year

Maximum 48 credits, Minimum 18 credits, subject to regulation 4.

## 6. Minimum Credits Required for Degree Award: 103

Breakdown as follows:

	Credits from			
	Core Taught Modules	Project/ Dissertation	Electives	GEMS
Degree	81	10	6	6

## 6.Assessment

Each module will be assessed over 100 marks with details as follows (unless otherwise specified):

The continuous assessment will count for 20 – 30% of the overall percentage mark of the module (s).

Continuous assessment may be based on seminars and/or assignments and should include at least two (2) assignments/tests per module.

## 7.Submission Deadline for Dissertation

Four copies of the dissertation (three spiral-bound copies and one copy on disk) should be submitted to the Faculty/Centre Registry not later than the last working day of March of the academic year.

## 9. List of Modules – BSc (Hons) Business Statistics with Economics

<b>Code CORE</b>	<b>Module Name</b>	<b>Hrs/Wrk L+P</b>	<b>Credits</b>
STAT 1131(1)	Mathematics for Statistics	3+0	3
STAT 1008Y(1)	Uncertainty and Inference	3+0	6
STAT 1009Y(1)	Statistical Reasoning and Practical Data Handling	3+0	6
STAT 2003Y(3)	Statistical Computing and Data Graphics	3+0	6
STAT 2004Y(3)	Statistical Inference and Decision Making	3+0	6
STAT 2005Y(3)	Survey Methods and Sampling Techniques	3+0	6
STAT 2222(3)	Operational Research	3+0	3
STAT 3014Y(5)	Multivariate Analysis & Business Intelligence	3+0	6
STAT 3015Y(5)	Time Series Analysis and Business Forecasting	3+0	6
ECON 1005Y(1)	Introduction to Economic Analysis	3+0	6
ECON 2001Y(3)	Microeconomic Theory	3+0	6
ECON 2002Y(3)	Macroeconomic Theory	3+0	6
ECON 2003Y(3)	Principles of Econometrics	3+0	6
ECON 2008Y(3)	Business Economics	3+0	6
ECON 3112(5)	Mauritian Economy	3+0	3
STAT 3000Y(5)	Dissertation	-	10
	GEM	-	6
<b>ELECTIVES</b>			
STAT 3016Y(5)	Stochastic Processes and Stochastic Finance	3+0	6
STAT 3017Y(5)	Generalised Linear Models and Survival Analysis	3+0	6
ECON 2004Y(3)	Money, Banking and Finance	3+0	6
ECON 3131(5)	International Trade	3+0	3
ECON 3182(5)	Introduction to Risk Management	3+0	3

## 10. Programme Plan – Bsc (Hons) Business Statistics with Economics

### LEVEL I

<b>Code CORE</b>	<b>Module Name</b>	<b>Hrs/Wrk L+P</b>	<b>Credits</b>
STAT 1131(1)	Mathematics for Statistics	3+0	3
STAT 1008Y(1)	Uncertainty and Inference	3+0	6
STAT 1009Y(1)	Statistical Reasoning and Practical Data Handling	3+0	6
ECON 1005Y(1)	Introduction to Economic Analysis	3+0	6
	GEM	-	6

### LEVEL II

<b>Code CORE</b>	<b>Module Name</b>	<b>Hrs/Wrk L+P</b>	<b>Credits</b>
STAT 2003Y(3)	Statistical Computing and Data Graphics	3+0	6
STAT 2004Y(3)	Statistical Inference and Decision Making	3+0	6
STAT 2005Y(3)	Survey Methods and Sampling Techniques	3+0	6
STAT 2222(3)	Operational Research	3+0	3
ECON 2001Y(3)	Microeconomic Theory	3+0	6
ECON 2002Y(3)	Macroeconomic Theory	3+0	6
ECON 2003Y(3)	Principles of Econometrics	3+0	6

### LEVEL III

<b>Code CORE</b>	<b>Module Name</b>	<b>Hrs/Wrk L+P</b>	<b>Credits</b>
ECON 2008Y(3)	Business Economics	3+0	6
ECON 3112(5)	Mauritian Economy	3+0	3
STAT 3014Y(5)	Multivariate Analysis & Business Intelligence	3+0	6
STAT 3015Y(5)	Time Series Analysis and Business Forecasting	3+0	6
STAT 3000Y(5)	Dissertation	-	10
<b>ELECTIVES</b>	<b>CHOOSE 6 CREDITS FROM</b>		
STAT 3016Y(5)	Stochastic Processes and Stochastic Finance	3+0	6
STAT 3017Y(5)	Generalised Linear Models and Survival Analysis	3+0	6
ECON 2004Y(3)	Money, Banking and Finance	3+0	6
ECON 3131(5)	International Trade	3+0	3
ECON 3182(5)	Introduction to Risk Management	3+0	3

## **11. Outline Syllabus**

### **STAT 1131(1) - MATHEMATICS FOR STATISTICS**

Summation notation. Functions and their limits. Differentiation. Taylor series. Integration. Partial derivatives. Relative minima, maxima, saddle point. Double integral. Beta and Gamma integral. Applications of matrices.

### **STAT 1008Y(1) - UNCERTAINTY AND INFERENCE**

The nature of uncertainty in business. Subjective and objective methods. The probabilistic framework. Probability distributions. Expectation and variance. Common discrete and continuous distributions. Applications in business. Bayesian approach.

Introduction to Statistical Inference: Point and interval estimation. Hypothesis testing.

### **STAT 1009Y(1) - STATISTICAL REASONING AND PRACTICAL DATA HANDLING**

Statistical Thinking. Objectives of statistical analysis. Data Structures. Levels of measurement. Basic processing techniques: sorting, ranking, classification. Data summaries: rates, ratios, percentages, averages and measures of variation and skewness. The construction of indices and indicators. Graphical and Tabular analysis and presentation. Exploratory Data Analysis. The analysis of relationships. Elementary time series analysis and forecasting. The use of computers and computer software (EXCEL, MINITAB and SPSS) in implementing the above.

### **ECON 1005Y(1) – INTRODUCTION TO ECONOMIC ANALYSIS**

Tools of Economic Analysis. Consumer Choice and Applications. Production and Costs: Technology, Cost Functions and Cost Curves. Factor Market Analysis. Competitive Markets, Monopoly and Monopoly Behavior, Oligopoly, Introduction to Game Theory. Market Failures and Externalities. The Keynesian Model of National Income Determination. Theories of Consumption, Savings and Investment. Money and Banking. Monetary Policy. General Equilibrium and Comparative Statics in the IS-LM Model. Inflation and Unemployment: The AD-AS Model, Expectations and the Phillips Curve. BoP, Exchange Rates and General Equilibrium in the Open Economy.

### **STAT 2003Y(3) - STATISTICAL COMPUTING AND DATA GRAPHICS**

An introduction to R language. Numbers and Vectors. Objects, their modes and attributes. Ordered and unordered factors. Arrays and Matrices. List and Data frames. Grouping, loops and conditional execution. Writing functions. Statistical models in R. Kernel Density Estimation using R. Graphical Procedures in R. Bootstrap & Re-sampling.

Principles of good Graphics. Video Presentation of Hans Rosling. History of statistical Graphs. Traditional Statistical Graphs. An introduction to R graphics. Trellis Graphs. Bubble Plot. Graphing Categorical Data using Mondrian. Graphing of 3 Dimensional Data in R.

### **STAT 2004Y(3) - STATISTICAL INFERENCE AND DECISION MAKING.**

Properties of estimators. Methods for deriving confidence intervals. Hypothesis testing. Likelihood ratio tests. Inference for ANOVA. Simple random effects model. Bayesian inference: the incorporation of prior information in the inferential process.

Bayesian decision theory: the integration of prior information, data and cost information. Utilities. Decision trees. Applications.

### **STAT 2005Y(3) - SURVEY METHODS AND SAMPLING TECHNIQUES**

Data collection strategies. The advantages of sampling. Sampling and non sampling errors. Stages in a sample survey. Alternative methods of administering a survey questionnaire. The design of survey questionnaires. Criteria for choosing sampling schemes. Simple random sampling. Stratified sampling. Systematic sampling. Cluster sampling. Multistage sampling. Estimates of means and proportions and their precision under alternative sample designs. Ratio and Regression estimators. Surveys of attitudes and opinions. Attitude scaling. Sample surveys in business, marketing and auditing.

### **STAT 2222(3) - OPERATIONAL RESEARCH**

An introduction to Operational Research. Linear Programming. The Theory of Simplex Method. Duality Theory and Sensitivity Analysis. Game Theory. Waiting Time Models. Non Linear Programming. Queuing Theory. Inventory Theory.

### **ECON 2001Y(3) - MICROECONOMIC THEORY**

Topics in Consumer Theory: Utility Maximisation , Demand, Slutsky Equation, Revealed Preference and Duality, Applications. Theory of Production and Costs. Factor Market Analysis. Market Structure: Competitive Markets and Monopoly.

Choice under Uncertainty and Applications. Game Theory and Applications. Oligopoly and Strategic Behaviour. Markets with Asymmetric Information: Moral Hazard and Adverse Selection. Principal-Agent Models and Optimal Incentive Schemes. General Equilibrium and Welfare Economics. Externalities and Public Goods.

### **ECON 2002Y(3) - MACROECONOMIC THEORY**

Introduction to General Equilibrium Model. IS-LM under a Government Budget Constraint. Theories of Consumption and Savings. Theories of Investment. Government Spending and Borrowing. Mundell-Fleming Model. Exchange Rate Models.

Rational Expectations. Policy Ineffectiveness Proposition. Lucas Critique. Supply. Side Recommendations. Further Aggregate Demand and Aggregate Supply Analysis. Central Bank Independence. Theories of Business Cycle. Growth Models.

### **ECON 2003Y(3) - PRINCIPLES OF ECONOMETRICS**

Classical Linear Regression Model: Hypothesis Testing. Multiple Regression Analysis. Breakdown of Assumptions: Heteroskedasticity, Serial Correlation, Multicollinearity, Measurement Errors, Endogeneity. Dummy Variables. Simultaneous Equation Models: Identification and Estimation Methods, Time Series Models: Distributed Lag Models, Unit Root Tests, Cointegration, and Error-Correction Models, Granger Causality, Introduction to VAR Modelling. Computer Applications.

### **ECON 2008Y(3) - BUSINESS ECONOMICS**

Demand analysis. Consumer Choice. Production and Costs. Decision Analysis. Uncertainty and Information: Adverse Selection, Moral Hazard, Principal-Agent Problems, Design of Optimal Incentive Plans. Externalities and Public Goods. Market Structures. Pricing Practices. Product Differentiation. Strategic Behaviour. Industry Structure and Performance. Risk Analysis and Capital Budgeting. Regulation. Managerial Economics: Taking a Global View.

### **ECON 3112(5) - MAURITIAN ECONOMY**

Contemporary Mauritian Economy: Macroeconomic Trends. Stabilisation and Structural Adjustment. Exchange Rate and Trade Policy. International Tourism and Development. Labour and Financial Markets and Institutions. Offshore Economic and Financial Activities. Regionalisation and Globalisation. Information Economy.

### **STAT 3014Y(5) - MULTIVARIATE ANALYSIS AND BUSINESS INTELLIGENCE**

Distribution in several dimensions. Multivariate Normal distribution. Inference. Exploring multivariate data. Principal Component Analysis. Factor analysis. Discriminant Analysis. Multidimensional scaling. Conjoint analysis.

Introduction to Data Mining. Data preprocessing. Exploratory Data Analysis. *Classification*: Decision Trees and Model Evaluation, Neural Networks. *Association*: Market Basket Analysis. *Clustering*: Hierarchical and k-Means Clustering. An overview of anomaly detection.

### **STAT 3015Y(5) - TIME SERIES ANALYSIS AND BUSINESS FORECASTING**

Examples of time series. Time series plot. Model-building strategy. Classical trend and seasonal model. Additive and multiplicative models. Decomposition. Exponential smoothing. Estimation. Forecasting using Holt-Winters method. Time series and stochastic processes. Autocovariance function. Random walk. Moving Average. White Noise. Stationarity. Models for stationary time series : general linear process, MA processes. AR processes. Invertibility. Box-Jenkins methods. ARIMA and SARIMA processes. Models for non-stationary time series. Differencing. Model specification. Properties of sample acf and pacf. Nonstationarity. AIC criterion. Model Estimation and diagnostics. Residual analysis. Box-Pierce and Ljung-Box statistics. Forecasting. Using R Statistical Language for time series analysis.

**STAT 3000Y(5) – DISSERTATION**

At the end of the third year of the programme, students will be required to submit a project dissertation. The title of the dissertation has to be approved by the Department of Economics and Statistics and a Project Supervisor identified by the Programme Co-ordinator. The dissertation length should be in the range of 8000–12000 words.

**STAT 3016Y(5) - STOCHASTIC PROCESSES AND STOCHASTIC FINANCE.**

Random variables and stochastic processes. Discrete time Markov chains (DTMC). Classification. Stationary distribution. Random walks. Simple applications of DTMC's. Counting processes and Poisson Processes. Non-homogeneous PP and Compound PP. Branching processes.

A simple market model. Risk-Free Assets. Risky Assets. Discrete Time Market Models. Portfolio Management. Brownian Motion. Stochastic differential equations. Elementary Itô calculus. The Black Scholes model.

**STAT 3017Y(5) - GENERALISED LINEAR MODELS AND SURVIVAL ANALYSIS**

Limitations of the general linear model. Scope and versatility of the generalised linear model. The exponential family of densities. Estimation of generalised linear models and hypothesis testing including use of relevant software. Logit, Probit, log-log and Poisson regression with business applications. Log linear analysis of multidimensional contingency tables. Multinomial response models. Survival models: Survival time. Hazard function. Cumulative hazard function. Censoring. Accelerated Life Models. Proportional Hazards Model. Exponential and Weibull Models. Time varying covariates. Time dependent effects. Business and actuarial applications.

**ECON 2004Y(3) - MONEY, BANKING AND FINANCE**

Money. Money Demand and Money Supply Analysis. Principles of Financial Intermediation. Banking. Interest Rates. Financial Markets. Regulation. Central Banking. International Banking. Monetary Policy. Transmission Mechanism Models. Mauritian Financial System and Development.

Investment Decisions - Choice under Uncertainty. Term Structure of Interest Rates. Asset Pricing Models and Applications. Security Valuation. Market Efficiency and Market Anomalies. Portfolio Analysis. The Mauritius Stock Exchange.

**ECON 3131(5) – INTERNATIONAL TRADE**

International Trade Theories: Ricardian and Heckscher-Ohlin Models. Offer Curves, Trade, Imperfect Competition and Economies of Scales: Intra-Industry Trade, International Factor Movements and FDI. Intertemporal Trade. Strategies and Policies, Instruments of Protection, Effects of Protection on Trade and Welfare, Dumping.

**ECON 3182(5) – INTRODUCTION TO RISK MANAGEMENT**

Sources and Types of Risk: Hedging Techniques. Foreign Exchange Markets. Foreign Exchange Exposure. International Techniques of Managing Forex Risk: Introduction to Forward and Futures Markets. Swaps: Interest Rate Currency and Commodity Swaps. Commodity Futures. Introduction to use of Options in Risk Management.

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