POSTGRADUATE INSTITUTE OF SCIENCE
UNIVERSITY OF PERADENIYA

Master of Applied Statistics Degree Programme
(SLQF Level 9)

Master of Science (M.Sc.) in Applied Statistics Degree Programme
(SLQF Level 10)

1. INTRODUCTION

Statistics is a professional discipline that deals with the application of scientific methods in decision making. The curricula of most science-based degrees do not give adequate coverage of designing experiments, analyses and interpretation of results. Even in social sciences, the treatment of data collection methods and data analyses is dealt at a superficial level. Therefore, graduates most often do not possess basic skills of conducting research projects, which can withstand critical scientific scrutiny.

A knowledge of statistics is essential not only to analyze data but more importantly at the designing stage of an experiment. It is essential that every institute that conducts research must have at least one qualified statistician (applied statistician or biometrician as the case may be).

2. OBJECTIVES OF THE PROGRAMME

The objective of this programme is to provide graduates who possess a knack for Mathematics, an adequate coverage of basic statistical theory, applications in designs of experiments and surveys, data analysis and methods of presentation and interpretation of results. At the completion of this course, the candidate will be able to fit in as an applied statistician in a research institute, planning institute or a government institute.

3. PROGRAMME ELIGIBILITY

Applicants must possess a Bachelors degree or an equivalent qualification acceptable to the Postgraduate Institute of Science. Graduates who are not familiar with calculus, set theory and matrix algebra are expected to follow a pre-requisite course in mathematics. A graduate who has no basic knowledge in statistics is expected to follow the preliminary courses in statistics. Preliminary courses are non-credit courses. Depending on the courses followed at the degree level

4. PROGRAMME FEE

Category	Programme Fee	
	Master of Applied Statistics Degree Programme	**M.Sc. in Applied Statistics Degree Programme**
Local candidates	Rs. 275,000/- (1 year)	Rs. 350,000/- (2 years)
Foreign candidates	Rs. 550,000/- (1 year)	Rs. 700,000/- (2 years)

Students registered for the Master of Applied Statistics degree programme shall pay the Programme fee in full or in two *(1/2 at the registration and the balance at the end of the first semester)* or three *(1/3rd at the registration, another 1/3rd after 4 months from the date of registration and the balance after 8 months from the date of registration)* installments. An additional payment of Rs. 75,000/- (or Rs. 150,000/- form foreign students) should be made at the end of the first year to continue for the M.Sc. in Applied Statistics degree programme. Other payments including registration fee, medical fee, library subscription, examination fee and deposits (science and library) should be paid according to the procedure stipulated by the PGIS. (N.B. The Programme fees given above may be revised as per recommendation of the Board of Management of the PGIS.)

5. THE PROGRAMME STRUCTURE AND DURATION

5.1 Masters Degree by Course Work (SLQF Level 9)

The Master of Applied Statistics degree can be obtained by completing course work only (without conducting any research project).

Course work, comprising of theory courses, and laboratory and/or fieldwork, shall be conducted over a period of two semesters of 15 weeks each. The total duration of the degree, including examinations, shall be about 12 months. Satisfactory completion of a minimum of 30 credits of course work with a GPA of not less than 3.00 is required for the successful completion of the degree - SLQF Level 9 (Students who do not satisfy the above criteria but obtain a GPA in the range 2.75 to 2.99 for course work of 25 credits are eligible for the Postgraduate Diploma in Applied Statistics - SLQF Level 8, and those who obtain a GPA in the range 2.75 to 2.99 for course work of 20 credits are eligible for Postgraduate Certificate - SLQF Level 7).

5.2 Masters Degree by Course Work and Research

In addition to Masters Degree with course work (5.1), the Masters Degree (Research) requires a research project. The duration of the entire programme shall be 24 months inclusive of 5.1. Completion of all the requirements of 5.1 with a GPA of not less than 3.00 is a prerequisite for the Masters Degree (Research). The research project for this degree should be conducted on full-time basis, and completed during the second year. The research component is allocated 30 credits, totalling 60 credits for the entire programme. After successful completion of the research project, the student shall be eligible for the award of the M.Sc. in Applied Statistics degree - SLQF Level 10 (Students

who do not complete the research project within the stipulated time period shall be awarded the Master of Applied Statistics degree - SLQF Level 9).

5.3 Extension of the programme for M.Phil. or Ph.D.

After conducting research for a period of six months in the M.Sc. degree (research) programme, students who have demonstrated exceptional progress may apply for upgrading the degree status to M.Phil. The student should continue the research project and any additional research work/assignments recommended by the PGIS for a total of two years (60 credits of research) to qualify for the award of the M.Phil. degree (SLQF Level 11).

During the second year of research, students who have demonstrated exceptional and continuous progress may apply for upgrading the degree status from M.Phil. to Ph.D. The student should continue the research project and any additional research work/assignments recommended by the PGIS for another year on full-time basis (additional 30 credits) to qualify for the award of the Ph.D. degree (SLQF Level 12).

Master of Applied Statistics Degree Programme (SLQF Level 9)
Master of Science (M.Sc.) in Applied Statistics Degree Programme (SLQF Level 10)

Programme Summary

Course Code	Course	Lecture hrs.	Practical hrs.	No. of Credits
SC 401	Mathematics[+]	*30*	-	-
SC 402	Computer Programming[++]	*20*	*20*	-
SC 403	Statistical Methods [+++]	*30*	-	-
SC 501	Theory of Statistics[*]	*30*	-	*2*
SC 502	Data Analysis & Presentation[*]	*30*	*30*	*3*
SC 503	Design and Analysis of Experiments[*]	*45*	-	*3*
SC 504	Regression Analysis[*]	*45*	-	*3*
SC 505	Sampling Techniques.	*30*	-	*2*
SC 506	Multivariate Methods I	*30*	-	*2*
SC 507	Stochastic Processes and Applications	*30*	-	*2*
SC 516	Time Series Modeling and Filtering[*]	*45*	-	*3*
SC 517	Non parametric and Categorical data analysis[*]	*45*	-	*3*
SC 519	Multivariate Methods II	*30*	-	*2*
SC 525	Special Topics[**]	*30*	*30*	*3*
SC 599	Independent Study[*1]	*500 notional hours*		*5*
SC 699	Research Project[*2]	*3000 notional hours*		*30*

Preliminary courses are not considered in the computation of the GPA

\+ - only for those who don't have a mathematics background

++ - only for those who don't have a statistical programming background

+++ - only for those who prefer an introduction to statistical methods

* - Compulsory Courses

** - Special Topics will be notified to students in each year.

**[1] Compulsory for Master of Applied Statistics degree* (*SLQF Level 9*)

**[2] Compulsory for M.Sc. in Applied Statistics degree* (*SLQF Level 10*)

6. PROGRAMME CONTENTS

Code	SC401
Title	Mathematics
Credits	2
Compulsory/ optional	Optional
Prerequisites	None
Aims	Aims of this course are to give students an introduction to mathematical concepts essential in data manipulation which includes calculus, matrix algebra and optimization.
Time allocation	Lectures & Tutorial: 30 hrs
Content	Number Systems, Inequalities, Elements of Set Theory. Coordinate Geometry: Lines, Circles and Parabolas. Calculus: Limits and Derivatives. Maxima, Minima and Inflextion points. Indefinite Integral, Definite Integral, Evaluation of area between curves, Integration by substitution, Partial differentiation. Matrix Algebra : Matrices, determinants and inverse of a matrix. Matrix approach to solution of system of equations. Rank of a matrix, eigen values., Introduction to numerical optimization.
ILOs	At the completion of the course, students will be able to • Evaluate definite and indefinite integrals. • Calculate the area under a curve. • Perform integrations by substitution and partial differentiation. • Evaluate multi dimensional data using matrix algebra.

Assessment criteria

Continuous assessments	End-semester examination
50%	50%

Recommended texts:

1. Hamming R.W. *Methods of Mathematics Applied to Calculus, Probability, and Statistics*, Dover Publications, 2004.
2. Waner S., Costenobel S., *Applied Calculus,* 6th Edition, Cengage Learning, 2013.

Code	SC402
Title	Computer Programming
Credits	2
Compulsory/ optional	Optional
Prerequisites	None
Aims	Aims of this course are to introduce the fundamental concepts of computer programming, equip students with sound skills in C/C++ programming language and techniques for developing structured and object-oriented computer programs.
Time allocation	Lectures & Tutorial: 20 hrs Practical: 20 hrs
Content	Programming environment; Process of application development. C/C++ Preprocessor; Program code; Functions; Comments; Variables and constants; Expressions and statements; Operators. Program Flow Control Branching and looping; Function parameters passing; Return values; Local and global variables; Scope of variables. Basic Object Oriented Programming Objects and classes; Create and delete objects in the free store; Pointer arithmetic; Passing function arguments by pointer; Returning values by pointer; Array of objects; Array and pointer; Array of pointers; Pointer of array; Character array; Command line processing. Input and output as streams; File I/O using streams.
ILOs	At the completion of the course, students will be able to • Familiarize themselves with at least one C/C++ programming environment. • Be proficient in using the basic constructs of C/C++ to develop a • computer program. • Be able to develop a structured and documented computer program. • Understand the fundamentals of object oriented programming and be able to apply it in computer program development.

Assessment criteria

Continuous assessments	End-semester examination
50%	50%

Recommended texts:

1. J. Liberty, S. Rao and B. Jones, *Sams Teach Yourself C++ in One Hour a Day*. Sams Publishing, 2009.
2. P.J. Deitel and H.M. Deitel, *C++ How To Program*, 7th ed., Pearson, 2010.

Code	SC403
Title	Statistical Methods
Credits	2
Compulsory/ optional	Optional
Prerequisites	None
Aims	Aims of this course are to provide students with a general understanding of descriptive and inferential statistics, and the opportunity to apply them to examine data related to applied sciences. Enable students to conduct statistical estimation and hypothesis testing with statistical software.
Time allocation	Lectures & Tutorial: 30 hrs
Content	Variability in observations. Parameters and statistics. Measures of location and spread. Frequency distributions, Histograms, Stem and Leaf, Box plots. Discrete data: Probability structure and cumulative distributions. Continuous data: Distribution functions, Family of Normal distributions. Expected values, Sampling distributions. Test of hypothesis. Estimation and tests on difference between 2 means and proportions. Simple linear regression and correlation, lack of fit, residual plots. Extension to multiple linear regression. One way and two-way ANOVA. Analysis of 2-way contingency tables.
ILOs	At the completion of the course, students will be able to • explain the basic concepts and select the appropriate measurements, tables and graphs to represent quantitative data in different scenarios • acquire techniques to describe/present the data set. • apply probabilistic and statistical reasoning to describe and analyse essential features of data sets and problems in real life situations. • use and extend knowledge of statistical inference techniques and their applications in real life situations

Assessment criteria

Continuous assessments	End-semester examination
50%	50%

Recommended texts:

1. Tong, H.Y et al, *Introduction to Probability and Statistics for Science Students*, Cengage Learning, 2013
2. Weiss, N.A., *Introductory Statistics*, 9th Edition, Addison Wesley, 2012.

Code	SC501
Title	Theory of Statistics
Credits	2
Compulsory/ optional	Compulsory
Prerequisites	None
Aims	The aim of this preliminary course is to introduce basic probability theory so that students can apply the theoretical knowledge in data analysis.
Time allocation	Lectures & Tutorial: 30 hrs
Content	Probability : Properties, conditional probability, independence. Discrete random variables: Probability mass functions and cumulative distributions. Some common discrete distributions. Continuous random variables: Marginal and conditional distributions, Bayes' Rule. Expectations and Central Limit Theorem. Sampling from the Normal distribution. Point and Interval estimation. Test of Hypotheses: Simple and composite hypothesis. Maximum likelihood estimation. Generalized Likelihood Ratio Tests. Tests on means and variances.
ILOs	At the end of the course students will be able to: • Identify the sample space and events of an experiment. • Calculate probabilities, conditional probabilities, expectation and variance of random variable. • Derive marginal densities and cumulative densities from a given probability distribution. • Calculate probabilities using Bayes' Rule. • Apply Central Limit Theorem to sampling distributions. • Carryout simple and composite hypothesis tests on mean, variance and proportion. • Estimate parameters using maximum Likelihood.

Assessment criteria

Continuous assessments	End-semester examination
50%	50%

Recommended texts:

1. Robert V. Hogg, Joeseph McKean, Allen T. Craig, *Introduction to Mathematical Statistics*, 7th Edition, Pearson, 2012.
2. Casella G., Berger R.L., *Statistical Inference*, 2nd Edition, Cengage Learning, 2008.

Code	SC 502
Title	Data Analysis & Report Writing
Credits	3
Compulsory/Optional	Optional
Prerequisites	SC404
Aims	This course introduces most important toolkits for modern statistical inference (e.g R and SAS). Main goal is to teach students to handle a statistical software in data analysis and interpret the results appropriately**.**
Time allocation	Lectures & Tutorial: 30 hrs Practical: 30 hrs
Content	Introduction to Statistical Software. MINITAB: Data management, Descriptive statistics. ANOVA, GLM and Regression. Non parametrics. SAS : Data entry and editing. Structure of a SAS programme. Procedures used for ANOVA, GLM, Regression, Orthogonal and Non-orthogonal analysis, Categorical data analysis, and Multivariate analysis. Presentation of results.
ILOs	At the end of the course students will be able to: • Use a statistical software to perform ▪a descriptive data analysis ▪a univariate hypothesis test ▪a multiple linear regression analysis ▪a one way and two way analysis of variance ▪a Generalized Linear Models • Communicate and present the results of a statistical data analysis.

Assessment criteria

Continuous assessments	End-semester examination
50%	50%

Recommended texts:

1. Booth W.C., Colomb G.G., Williams J.M., *A Manual for Writers of Research Papers, Theses, and Dissertations*, Seventh Edition: Chicago Style for Students and Researchers (Chicago Guides to Writing, Editing, and Publishing) , 7th edition, 2007.
2. Matloff N., *The Art of R Programming: A Tour of Statistical Software Design,* No Starch Press, 2011.

Code	SC 503
Title	Design and Analysis of Experiments
Credits	3
Compulsory/Optional	Optional
Prerequisites	SC404
Aims	Learn how to plan, design and conduct experiments efficiently and effectively, and analyze the resulting data to obtain objective conclusions. Both design and statistical analysis issues are discussed.
Time allocation	Lectures & Tutorial: 45 hrs
Content	Principles of design. Completely randomized and complete Block Design. Latin Square Design and its variations. Covariance analysis. Factorial experiments, fixed and random effects model, split plot designs. Nested factorials. Incomplete block designs. Balanced and partially balanced incomplete block designs. Confounding and fractional factorials in 2^n, 3^n and p^n experiments. Asymmetric factorials. Lattice designs. Diallel experiments. Basic ideas in construction of design.
ILOs	At the end of the course students will be able to: • describe the principles of design. • choose an appropriate experimental design to a given problem. • perform a covariance analysis of an experimental design. interpret the outcomes of an analysis of an experimental design

Assessment criteria

Continuous assessments	End-semester examination
50%	50%

Recommended texts:

1. Montgomery D.C., *Design & Analysis of Experiments*, 8th Edition, Wiley, 2012.
2. Jobson J.D. , *Applied multivariate data analysis : Regression and Experimental Design*, Springer, 1991.

Code	SC504
Title	Regression Analysis
Credits	3
Compulsory/Optional	Compulsory
Prerequisites	
Aims	To acquaint students with Least Square methods and concept of linear regression, correlation, and its applications, To approach the material with matrices algebra, To develop the ability to build linear and nonlinear regression models.
Time allocation	Lectures & Tutorial: 45 hrs
Content	Simple linear regression and correlation, lack of fit, residual plots, Extension to multiple linear regression, Matrix approach to linear regression, Linear models. Multiple linear regression, Interpretation of coefficients. Inferences in regression analysis. Sequential and partial regression sums of squares. Analysis of aptness of the model. Model selection procedures. Introduction to non-linear regression. Introduction to regression models, matrix formulation, Gram-Schmidt theory, Regression LSEs, Regression MLEs under normality, confidence sets and LR tests, Cross sectional modeling and Hetroscedasticity, Multicollinearity, Ridge regression, weighted and generalized least squares, Multiple Regression, Logistic Regression, Non-linear and maximum Likelihood Modeling, Splines and other bases, Kernel smoothing. Artificial Neural Network Models.
ILOs	At the end of the course students will be able to: • Write regression model in matrix form. • Calculate least square estimates and Maximum Likelihood estimates of regression parameters. • Identify remedies for hetroscedasticity and multicollinearity. • Analyse data using multiple regression techniques. • Perform kernel smoothing. • Use unsupervised learning method to fit regression models

Assessment criteria

Continuous assessments	End-semester examination
50%	50%

Recommended text:

1. Kutner M.H., *Applied Statistical Models*, McGraw-Hill education, 2013.
2. Christensen R. , *Analysis of Variance, Design and Regression: Linear modelling for unbalanced data*, Chapman & Hall/CRC 2, 2015

Code	SC505
Title	Sampling Techniques
Credits	2
Compulsory/Optional	Optional
Prerequisites	
Aims	To introduce sample survey methods and to provide the appropriate tools and techniques to analyze survey data.
Time allocation	Lectures & Tutorial: 30 hrs
Content	Population and sample. Taxonomy of sampling procedures. Accuracy and precision. Survey methods. Questionnaire designing. Validation of data. Simple random sampling: properties of estimates, standard error of estimates. Estimation of ratios. Sampling proportions. Estimation of sample sizes. Stratified random sampling, Proportional and optimum allocation. Cluster sampling. Systematic sampling, Selection with probability proportional to size. Multistage sampling. Regression and ratio estimates. Applications.
ILOs	At the end of the course students will be able to: • Understand concepts and techniques in sampling methods • Develop sample survey methods. • Apply the appropriate tools and techniques to analyse survey data • Assess and develop survey designs for real world situations.

Assessment criteria

Continuous assessments	End-semester examination
50%	50%

Recommended text:

1. Cochran, W. G., *Sampling techniques*, 3rd Edition, Wiley, 1977.
2. Scheaffer, R.L., Mendenhall, W., Ott, R.L. & Gerow, K.G., *Survey sampling*, 7th Edition, Cengage Learning, 2011.

Code	SC506
Title	Multivariate Methods I
Credits	2
Compulsory/Optional	Optional
Prerequisites	
Aims	To teach the student about multivariate visualization, multivariate normal distribution, hypothesis testing for multivariate data and statistical methods that uncover surprising but valid linkages between variables and explain and predict their measured values.
Time allocation	Lectures & Tutorial: 30 hrs
Content	Introduction to multivariate analysis. Multivariate normal distribution. Expected values. Variance - Covariance matrix. Principal component analysis (PCA). Interpretation using illustrative examples. Factor analysis. Comparison with PCA, factor loadings, rotations, Interpretation. Cluster Analysis
ILOs	At the end of the course students will be able to: • give an account of some methods of visualizing multivariate data sets • give an account of and use multivariate normal distribution • perform statistical tests of the mean value vector of a multivariate normal distribution • perform statistical tests of two or several populations of a multivariate normal distribution • give an account of methods and techniques for validation of multivariate normal distribution. • use principal component and factor analysis for typical problems

Assessment criteria

Continuous assessments	End-semester examination
50%	50%

Recommended text:

1. Johnson R. A. and Wichern D.W. , *Applied Multivariate Statistical Analysis*, 6th Edition, Pearson publications, 2007
2. Rencher A.C. , *Multivariate Statistical inference & Applications*, Wiley Interscience, 1997.

Code	SC507
Title	Stochastic Processes and Applications
Credits	2
Compulsory/optional	Optional
Prerequisites	
Aims	The course aims to give an introduction to the theory of stochastic processes in with special emphasis on applications and examples.
Time allocation	Lectures & Tutorial: 30 hrs
Content	Recurrent events, Random walks, Markov chains, Transition probabilities, Limiting distributions, Discrete branching processes, Markov processes in continuous time, Poisson processes and their applications, Birth & Death processes, Queuing theory and applications.
ILOs	Upon successful completion of this course, students should be able to: • explain at high levels concepts from probability and describe basic stochastic processes. • evaluate various quantities for probability distributions and random variables. • formulate and solve problems about stochastic processes. develop mathematical models for a range of empirical phenomena and analyse models of queuing system on the basis of stochastic processes.

Assessment criteria

Continuous assessments	End-semester examination
50%	50%

Recommended Texts:

1. Gallager R.G., *Stochastic Processes: Theory for Applications*, 1st Edition, Cambridge University Press, 2014.
2. Ross S.M. , *Introduction to probability models*, 11th Edition, Academic Press, 2014.

Code	SC516
Title	Time Series Modeling and Filtering
Credits	3
Compulsory/optional	Compulsory
Prerequisites	SC501
Time allocation	Lectures & Tutorial: 45 hrs
Aims	To provide the basic theory and tools for the statistical analysis and interpretation of time series.
Intended learning outcomes	At the end of the course students will be able to: • Define time series data in an appropriate statistical framework. • Summarize and carry out exploratory and descriptive analysis of time series data. • Describe and conduct appropriate statistical modelling techniques for time series data. • Use R competently to model and produce point and interval forecasts and interpret the results for time series data. • Derive the statistical properties of linear time series models. • Present and communicate, both orally and in written-form, the results of statistical analyses of time series data
Content	Introduction and examples, Stationary processes, Filtering, MA, AR, and ARMA processes, causal and invertible processes, Spectral representation of a stationary process, Prediction in frequency domain, Recursive computation of the best linear predictor and its mean squared error, Estimation and model selection, Goodness-of-fit issues, Non stationary time series, ARIMA models and extensions.

Assessment criteria: Continuous Assessment

Continuous assessments	End-semester examination
50%	50%

Recommended Texts:

1. Brockwell P. and Davis R. (2009), Time Series: Theory and Methods, Springer publications.
2. Chatfield C. (2003), The Analysis of Time Series, An Introduction, Chapman & Hall

Course code	SC 517
Course title	Nonparametric and Categorical data analysis
Credits	3
Compulsory/optional	Compulsory
Prerequisites	SC 501
Time allocation	Lectures & Tutorial : 45 hrs
Aims	To introduce students the wide range of interesting nonparametric ideas in statistics.
Intended learning outcomes	Upon successful completion of this course, students should be able to: • Describe the properties of commonly used statistical distributions for modelling non-normal data • Decide whether parametric or non-parametric test is suitable for analysing data in a certain situation as well as carrying out the test • Use the basic methods to analyse contingency tables • Recognize and define the categorical data, recall key concepts of models for categorical data, state analysis plan and reproduce a research design.
Content	Nonparametric statistical tests: one sample, two samples tests, correlation tests, tests of independence, Wald-Wolfowitz runs test, Kruskal-Wallis test, Friedman test. Categorical Data Analysis : Multinomial distribution and Goodness of fit tests, The Kolmogorov-Smirnov test, Inference on two-dimensional contingency tables, Models for binary response variables and generalized linear models, model diagnostics log-linear models: log-linear models for two or more dimensions, testing goodness of fit, estimation model parameters, Strategies in model selection, Analysis of deviance, Log-linear models for ordinal variables.

Assessment criteria: Continuous Assessment

Continuous assessments	End-semester examination
50%	50%

Recommended Texts:

1. Gibbons J.D. & Chakrabortic S.(2010), Nonparametric Statistical Inference, Chapman & Hall
2. Alan Agresti (2012), Categorical Data Analysis, Wiley Publications

Code	SC519
Title	Multivariate Methods II
Credits	2
Compulsory/optional	Compulsory
Prerequisites	SC506
Aims	Introduce further topics in Multivariate Analysis as an extension to SC506.
Time allocation	Lectures & Tutorial: 30 hrs
Content	Two-groups Discriminant analysis. Multiple-group Discriminant analysis. Multivariate analysis of variance. Canonical correlation. Covariance structure models. Multivariate Data Visulization; Multidimensional scaling, correspondence analysis, Biplots.
ILOs	Upon successful completion of this course, students should be able to: • identify the relevant method to reduce high dimensional data • use methods for multiple inference evaluate covariance structure models

Assessment criteria

Continuous assessments	End-semester examination
50%	50%

Recommended Texts:

1. Johnson R.A. and Wichern D.W. , *Applied Multivariate Statistical Analysis*, 6th Edition, Pearson publications, 2007
2. Rencher A.C. , *Multivariate Statistical inference & Applications*, Wiley Interscience, 1997.

Course code	SC 599
Course title	Independent Study
Credits	5
Compulsory/optional	Compulsory
Prerequisites	
Time allocation	500 notional hours
Aims	To familiarize the student with concepts and methods involved in scientific research
Intended learning outcomes	Upon successful completion of this course, students should be able to: • Conduct a literature review for a statistical problem • Cleary define the objective and methodology of a research problem • Carry out a mini research project or a case study in statistics related problem • Make presentations on the analysis outcomes
Content	Students will study the information on selected research papers and present them in the form of seminars. By involving in an industry related study students will write research proposals, undertake a mini project and present results and conclusions.

Assessment criteria: Continuous Assessment

Literature review and proposal writing	Research project	Project presentation
30%	40%	30%

Recommended Texts:

1. Backwell, J. and Martin, J. (2011) A Scientific approach to Scientific writing, Springer.
2. Postgraduate Institute of Science (2016) Guidelines for writing M.Sc. Project Report/M.Phil. Thesis/ PhD Thesis

Course code	SC 699
Course title	Research Project
Credits	30
Compulsory/optional	Compulsory
Prerequisites	GPA of 3.00 at M.Sc. (Course work)
Time allocation	3000 notional hrs.
Aims	The overall aim is to prepare the student to conduct a research independently. Specific aims: 1. To train students to apply scientific method in scientific research. 2. To train students to generate researchable hypotheses. 3. To train students to plan, design and conduct scientific research. 4. To gather reliable scientific data, analyse, and interpret. 5. To develop skills in scientific writing.
Intended learning outcomes	At the end of the successful completion of the course, students will be able to, 1. Apply the scientific method. 2. Design a research project. 3. Complete a research project. 4. Describe ethical issues in scientific research 5. Explain the patenting process in research 6. Make presentations at national/international conferences. 7. Produce a thesis conforming to the requirements of the PGIS. 8. Write manuscripts for publication in refereed journals.
Content	The students will conduct sufficient amount of work on a chosen research topic under the guidance provided by an assigned supervisor/s, make a presentation of research findings at a national/international conference, and produce a thesis.

Assessment criteria:

Continuous assessment	End-semester examination
30%	Oral examination (20%) Thesis (40%) Final presentation (10%)

Recommended Texts:

1. Backwell, J. and Martin, J. (2011) A Scientific approach to Scientific writing, Springer.
2. Postgraduate Institute of Science (2016) Guidelines for writing M.Sc. Project Report/M.Phil. Thesis/ PhD Thesis

Note: The format of the Thesis is available in the PGIS website.

CONTENTS OF OTHER COURSES

SC 525: Special Topics (3 credits)
The special topics will be different in different years and will be based on the latest developments in Statistics/Applied Statistics.

7. PROGRAMME EVALUATION

Evaluation of Course work

Based on the scheme given below, the overall performance of a student in a given course shall be evaluated by the respective instructor(s) and a grade shall be assigned.

Evaluation Scheme

- For all courses a minimum of 80% attendance is expected.
- The evaluation of each course shall be based on within course and end of course examinations, and assignments. The weightage of marks given below can generally be used as a guideline in the computation of the final grade.

End of course examination	50 - 60%
Continuous assessments (mid-semester examination, assignments, etc.)	40 - 50%

- Courses with laboratory and/or fieldwork shall be evaluated, where applicable, on a continuous assessment basis.
- The minimum grade a student should achieve to pass a course is C.
- Students will be informed of the evaluation scheme by the instructor at the beginning of a given course.

Grade Points and Grade Point Average (GPA)
The Grade Point Average (GPA) will be computed using the grades earned for core courses and optional courses, taken for credit. Preliminary courses, industrial training, research project and seminar will be evaluated on a pass/fail basis.

On completion of the end of course examination, the instructor(s) is/are required to hand over the grades of a given course to the programme coordinator who will assign the Grade Points using the following table:

Grade	Grade Point
A+	4.0
A	4.0
A^-	3.7
B^+	3.3
B	3.0
B^-	2.7
C^+	2.3
C	2.0
F	0.0

The Grade Point Average (GPA) will be computed using the formula:

$$\text{GPA} = \frac{\sum c_i g_i}{\sum c_i}$$ where c_i is the number for the i^{th} course, and

g_i is the grade point for the i^{th} course

Make-up Examinations
'Make-up' examinations may be given only to students who fail to sit a particular examination due to medical or other valid reasons acceptable to the PGIS.

Repeat Courses
If a student fails a course or wishes to improve his/her previous grade in a course, he/she shall repeat the course and course examinations at the next available opportunity. However, he/she may be exempted from repeating the course, and repeat only the course examinations if recommended by the teacher-in-charge or M.Sc. Programme Coordinator. The student may repeat the same course or a substituted (new) optional course in place of the original course. A student is allowed to repeat five credits of coursework free-of-charge. The maximum number of credits a candidate is allowed to repeat is fifteen. The maximum grade, a candidate could obtain at a repeat attempt is a B and he/she is allowed to repeat a given course only on two subsequent occasions.

Evaluation of Research Project

Research project will be evaluated on the basis of a written report (M.Sc. project report) and oral presentation (see Section 6.0 of the PGIS Handbook for the format of the project report).

8. PANEL OF TEACHERS

	Name, qualifications and affiliation/Address	**Area of Specialization**
1.	Dr. H. T. K. Abeysundara, *BSc (Perad.), MSc (Texas Tech), PhD (Texas Tech),* Dept. of Statistics and Computer Science, UOP.	*Asymptotic Theory, Functional data analysis*
2	Dr. S. P. Abeysundara, *BSc (Perad.), MSc (Texas Tech), PhD (Texas Tech),* Dept. of Statistics and Computer Science, UOP.	*Nonlinear modeling, Statistical Learning*
3	Prof. W. B. Daundasekara, *BSc (Perad.), MA (Alabama), PhD (Alabama),* Dept. of Mathematics, UOP.	*Mathematics*
4	Dr. P.L. Gamage, *BSc (CMB), MSc (Texas Tech),PhD (Texas Tech),* Dept. of Statistics, University of Colombo.	*Asymptotic Theory*
5	Dr. D. S. K. Karunasinghe, *BSc Eng (Perad.), PhD (NUS),* Dept. of Engineering Mathematics, UOP.	*Mathematics & Statistics*
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