The Master of Professional Science (MPSc.) in Applied Statistics program shall extend over four semesters during two academic years. The total credit of courses is 40, totaling 1000 marks, 28 credits of which being compulsory courses and remaining 4 credits are optional courses in the 2nd semester. In the 2nd semester, students have the option to choose any one of the available optional courses offered by the department. Out of 40 credits, 4 credits of practical courses and 4 credits of viva-voce examination has to be taken by the students in four semesters.

Distribution of Courses:

- Theory: 8 courses (100 marks each course)
- Practical: 2 courses (50 marks each course)
- Viva-voce: 2 courses (50 marks each course)

### Courses for the First Semester

<table>
<thead>
<tr>
<th>Course ID</th>
<th>Course Title</th>
<th>Marks</th>
<th>Credit</th>
</tr>
</thead>
<tbody>
<tr>
<td>MPS-1101</td>
<td>Sampling Distribution and Inference</td>
<td>100</td>
<td>4</td>
</tr>
<tr>
<td>MPS-1102</td>
<td>Statistics for Sustainable Development</td>
<td>100</td>
<td>4</td>
</tr>
<tr>
<td>MPS-1103</td>
<td>Applied Regression Analysis</td>
<td>100</td>
<td>4</td>
</tr>
<tr>
<td>MPS-1104</td>
<td>Management Information Systems (MIS)</td>
<td>100</td>
<td>4</td>
</tr>
<tr>
<td>MPS-1105</td>
<td>Statistical Software for Data Analysis</td>
<td>50</td>
<td>2</td>
</tr>
<tr>
<td>MPS-1106</td>
<td>Oral-I</td>
<td>50</td>
<td>2</td>
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<td><strong>Total</strong></td>
<td></td>
<td><strong>500</strong></td>
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</table>

### Courses for the Second Semester

#### Compulsory Courses

<table>
<thead>
<tr>
<th>Course ID</th>
<th>Course Title</th>
<th>Marks</th>
<th>Credit</th>
</tr>
</thead>
<tbody>
<tr>
<td>MPS-1201</td>
<td>Research Planning, Monitoring and Evaluation</td>
<td>100</td>
<td>4</td>
</tr>
<tr>
<td>MPS-1202</td>
<td>Applied Multivariate Analysis</td>
<td>100</td>
<td>4</td>
</tr>
<tr>
<td>MPS-1203</td>
<td>Time Series Data Analysis and Forecasting</td>
<td>100</td>
<td>4</td>
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</tbody>
</table>

#### Optional Courses (Any One)

<table>
<thead>
<tr>
<th>Course ID</th>
<th>Course Title</th>
<th>Marks</th>
<th>Credit</th>
</tr>
</thead>
<tbody>
<tr>
<td>MPS-1204</td>
<td>Actuarial Statistics</td>
<td>100</td>
<td>4</td>
</tr>
<tr>
<td>MPS-1205</td>
<td>Agricultural and Environmental Statistics</td>
<td>100</td>
<td>4</td>
</tr>
<tr>
<td>MPS-1206</td>
<td>Biostatistics and Epidemiology</td>
<td>100</td>
<td>4</td>
</tr>
<tr>
<td>MPS-1207</td>
<td>Categorical Data Analysis</td>
<td>100</td>
<td>4</td>
</tr>
<tr>
<td>MPS-1208</td>
<td>Industrial Statistics and Operations Research</td>
<td>100</td>
<td>4</td>
</tr>
<tr>
<td>MPS-1209</td>
<td>Quantitative Genomics and Bioinformatics</td>
<td>100</td>
<td>4</td>
</tr>
<tr>
<td>MPS-1210</td>
<td>Statistical Data Mining</td>
<td>100</td>
<td>4</td>
</tr>
<tr>
<td>MPS-1211</td>
<td>Physical Health and Human Growth Modeling</td>
<td>100</td>
<td>4</td>
</tr>
<tr>
<td>MPS-1212</td>
<td>R Programming and Statistical Computing</td>
<td>50</td>
<td>2</td>
</tr>
<tr>
<td>MPS-1213</td>
<td>Oral - II</td>
<td>50</td>
<td>2</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td><strong>500</strong></td>
<td><strong>20</strong></td>
</tr>
</tbody>
</table>
MPS-1101: Sampling Distribution and Inference

Expectations of functions of random variables, Transformations for discrete and continuous random variables.
Sampling from the normal distributions. chi-square, F, Student's t- distributions: definitions, derivations, properties, applications.
Point estimator, properties of estimator, Methods of finding estimators, Confidence intervals. Hypothesis testing. Goodness-of-fit tests.

Text Books:


MPS-1102: Statistics for Sustainable Development (SSD)


Text Books:


MPS-1103: Applied Regression Analysis

Fitting a straight line by least squares, Checking the fitted model, Linear regression in matrix terms, Special topics on multiple linear regression, Selecting the best regression model, Ridge regression.

Text Book:

MPS-1104: Management Information Systems (MIS)


Text Books:


MPS-1105 Lab: Statistical Software for Data Analysis

Uses of SPSS/ Minitab/ Eviews software for statistical analysis.

MPS-1201: Research Planning, Monitoring and Evaluation

Concept, aims and objectives of research, types of research, steps involved in research, selection and formulation of research problems; proposal writing. Questionnaire, Report writing, Examining some local and international reports. The concept of monitoring and evaluation (M & E): objectives, usefulness and scope of M & E. Timing and type of M&E, Monitoring and evaluation plan and data sources, Enhancing the use of knowledge from monitoring and evaluation, Application: monitoring and evaluation in population, health, nutrition, and other socio-economic programs relating to education, industry and parity.

Text Books:


MPS-1202: Applied Multivariate Analysis

Preliminaries of multivariate analysis, Random vectors and random sampling, multivariate normal distribution. Principal Components Analysis (PCA), Factor Analysis (FA), Independent Component Analysis (ICA), Canonical Correlation Analysis (CCA), Classification, Clustering.

Text Books


MPS-1203: Time Series Data Analysis and Forecasting

Objectives of time series analysis, Simple descriptive Techniques, Time series models: ARMA model, ARIMA model.
Spectral Analysis, Non-stationary time series, Time Series Models of heteroskedasticity.
Forecasting, prediction theory.

Text Books:


MPS-1204: Actuarial Statistics


Text Books:


MPS-1205: Agricultural and Environmental Statistics

Agricultural statistics: definition; basic and current statistics; agricultural production; crops; crop yields; estimation of mean yields; crop cutting experiment; crop forecasting; livestock; livestock inventory; administrative reporting; sample survey. Census of agriculture: objectives; scope; coverage; concepts and definitions. Statistics of selected agricultural crops; index number of agricultural production; weights, indices used; types of agricultural prices; collection and indices of agricultural prices.
Environmental Variables, Hazard in the environment, Study of Agro-meteorological features, Drought and Flood management, Food security and Environmental impact on health and agriculture, Environmental data analysis, Geographical Information System (GIS), Global Positioning System (GPS).
Text Books:


MPS-1206: Biostatistics and Epidemiology

Basic Concept of survival data and function, Lifetime distributions, Parametric Regression Models, Proportional Hazards Models, Accelerated test models, Multivariate lifetime models, Clinical Trials.


Text Books:


MPS-1207: Categorical Data Analysis

Description and inference for binomial and multinomial variables using proportions and odds ratios, multi-way contingency tables, generalized linear models for discrete data, logistic regression for binary responses, multi-category logit models for nominal and ordinal responses, inference for matched-pairs and correlated clustered data, loglinear models.

Text Books:


MPS-1208: Industrial Statistics and Operations Research

Fundamental concepts of industrial statistics and its purposes.

Quality: concepts of quality, total quality and quality control, quality characteristics, economics, policy and objectives, specifications TQM and various quality standards.

Inspection: Need for inspection, types of inspections, inspection stages-where and how much to inspect, organizing for inspection. Quality control: Basic objectives, Product effectiveness & quality of design, manufacture and performance, total systems cost, quality assurance, benefits from quality assurance on reliability and quality control, quality control and production relationship in organization structure, statistical quality.
Control charts: General theory, control chart, control charts for attributes: concepts of nonconformity; nonconforming unit; defect; defective unit; p-chart; d-chart; c-chart; u-chart; statistical basis and interpretation of, R and S charts.

Acceptance sampling: Elementary concept of sampling by attributes, single & double sampling tables, construction and use of OC curve, types of OC curves; properties of OC curves.


Text Books:


MPS-1209: Quantitative Genomics and Bioinformatics

Basic of genomics, Marker Analysis of Phenotypes, Structure of QTL Mapping, Interval Mapping Approaches for QTL Analysis, Gene Expression QTL analysis, Genome-wide SNPs and Haplotype Analysis.


Text Books:


MPS-1210: Statistical Data Mining

Introduction to data mining, Data Analysis, Association Rules, K-Nearest Neighbor Algorithm, Decision Trees, Neural Networks, Kohonen Networks, Model Evaluation Techniques.

Text Books:

MPS-1211: Physical Health and Human Growth Modeling

Morphometry, BMI, Vital capacity, Different indices, Growth and Maturation, Sequence of adolescent events, Lung Capacity and its measurement, Growth Failure and its synonyms, Symptoms, Causes and Treatment, Heart Failure and its Warning sign, Risk, Symptom, Prevention & Treatment.

**Growth Model**: Biological variables and its secular trends, Algometry Model, the Gompertz and logistic growth models, Jenss model, Count model, double logistic model, PB models, ICP model, Reed models, SSC model, JPPS model, JPA-1 and JPA-2 models, modified ICP model, BTT model and Kernel’s (non-parametric) model, Wavelet model, polynomial model, growth variations due to genetics and nutrition. Twin growth, heritability of growth.

**Higher Dimensional Growth Model**: Extension of BTT model, Extension of other growth models.

Text Books:


**MPS-1212 Lab: Comprehensive Statistical Computing** (by Statistical Software and Programming)

Uses of software and programming language for statistical analysis.