Course Code: M4H511
Course Title: Sampling and Survey
Pre-requisites: MH2500 Probability & Introduction to Statistics and MH3500 Statistics
Contact Hours: 3 hours lecture and 1 hour tutorial per week

Course Aim:
Surveys and samples is part of our daily life. By understanding the basic characteristics of various sampling designs, you will be able to appreciate information reported in the medias. This course gives an introduction to the statistical aspects of taking and analysing a sample. You will learn to determine the appropriate design in various situations, use the correct method for analysis and interpret the results. This course is essential for working Statisticians.

Intended Learning Outcomes:
1. Recognise and describe various sampling designs discussed throughout the course.
2. Compute the estimates for population mean, proportion and total under each of the sampling schemes.
3. Construct confidence intervals for the population parameters.
4. Apply ratio and regression estimations to improve the accuracy of estimates.
5. Determine the sample size required and its allocation under given conditions.
6. Explain the importance of nonresponse and apply techniques to reduce nonresponse rate.

Course Content:
Probability Sampling
- Types of Probability Samples
- Simple Random Sampling
- Estimation of Population Mean, Proportion and Total
- Sample Size Estimation
- Systematic Sampling

Stratified Sampling
- Theory of Stratified Sampling
- Sampling Weights
- Estimation of Population Mean, Proportion and Total
- Allocating Observations to Strata
- Sample Size Estimation
- Defining Strata
- Post-stratification

Ratio and Regression Estimations
- Ratio Estimation
- Regression Estimation
- Selecting the Sample Size
- Relative Efficiency of Estimators

Cluster Sampling
- One-Stage and Two-Stage Cluster Samplings
- Estimation of Population Mean, Proportion and Total
- Selecting the Sample Size
- Cluster Sampling with Probability Proportional to Size

Sampling with Unequal Probabilities
- One-Stage Sampling with Replacement
- Two-Stage Sampling with Replacement
- Unequal-Probability Sampling without Replacement
<table>
<thead>
<tr>
<th>Nonresponse</th>
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<tr>
<td>• Effects of Ignoring Nonresponse</td>
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<td>• Call backs and Two-Phase Sampling</td>
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<td>• Weighting Methods for Nonresponse</td>
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<td>• Imputation</td>
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**Reading and References:**

1. Sampling: Design and Analysis. Lohr, 2nd Ed, Brooks/Cole (978-0495105275)

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**Division of Mathematical Sciences**