COURSE DETAILS
Course Code: F78PB
Full Course Title: Probability and Statistics B
SCQF Level: 8
SCAF Credits: 15
Available as Elective: No

DELIVERY LEVEL
Undergraduate: Yes  Postgraduate Taught: Yes  Postgraduate Research: No

COURSE AIMS
- To reinforce basic ideas related to the description and analysis of data
- To provide an introduction to statistical modelling, estimation, hypothesis testing and regression and develop the basis for their application

LEARNING OUTCOMES – SUBJECT MASTERY

After studying this module, students should be able to:

- Understand, interpret and describe data using appropriate numerical and graphical summaries
- Compare distributions of data with theoretical distributions
- Understand issues related to data collection, model construction and model choice
- Distinguish between population parameters and sample statistics
- Explain the concept of a sampling distribution and be familiar with properties of estimators
- Calculate point estimates using the method of moments
- Understand the concept of maximum likelihood estimation and derive maximum likelihood estimates in various applications
- Compare data from two populations
- Construct, calculate and interpret confidence intervals for parameters of interest in one or two populations
- Understand and interpret the concepts of null hypothesis, alternative hypothesis, critical region, level of significance and P-values
- Perform hypothesis tests for population parameters
- Realise and understand the connection between hypothesis testing and confidence intervals
- Investigate associations between two variables
- Perform linear regression analysis and interpret findings meaningfully
- Simulate from probability distributions using the inverse CDF method
- Demonstrate results related to sampling distributions, the central limit theorem and confidence intervals using simulation

LEARNING OUTCOMES – PERSONAL ABILITIES

At the end of the module, students should be able to:

- Demonstrate the ability to learn independently
• Manage time, work to deadlines and prioritise workloads
• Use an appropriate computer package to describe and simulate data and to perform parameter estimation and testing
• Present results in a way which demonstrates that they have understood the technical and broader issues of statistical estimation and testing
• Communicate statistical results effectively to non-specialists

SYLLABUS

• Analysis of simple data (single variable distributions)
• Construction of statistical models
• Sampling distributions, some properties of estimators
• Introduction to the method of moments and maximum likelihood
• Statistical inference for data from one population
• Comparisons of data from two populations
• Confidence intervals with samples from one or two populations
• Hypothesis Testing: introduction, terminology and test statistics for typical situations
• Issues related to association between two variables: graphical techniques, correlation and contingency tables
• Linear regression
• Simulation and statistical computing

COURSE RELATIONSHIPS

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<th>School</th>
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<td>School of Math and Comp Sci.</td>
<td>Pre-Requisite</td>
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LOCATION AND ASSESSMENT METHODS

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