F77SB Introduction to Statistical Science B

COURSE DETAILS
Course Code: F77SB
Full Course Title: Introduction to Statistical Science B
SCQF Level: 7
SCAF Credits: 15
Available as Elective: No

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

COURSE AIMS

- To develop simple probability models for data
- To understand important features of these models

LEARNING OUTCOMES – SUBJECT MASTERY

After studying this course, students should be able to:

- Carry out probability calculations for basic discrete probability models
- Determine the distribution of a discrete random variable and carry out related probability calculations
- Compute the expected value, variance, and standard deviation of a discrete random variable
- Recognise the experimental situations that are modelled by Binomial, Geometric, Hypergeometric, and Poisson random variables
- Use indicator variables to calculate expected value and variance.
- Use probability inequalities to obtain probability bounds.

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 investigate the properties of random samples and to present and describe data
- Provide coherent explanation for various standard calculations in discrete probability

SYLLABUS

- Introduction to discrete probability models including sample spaces, probability functions, axioms of probability and consequences of the axioms
- Conditional probability, Partition Theorem, Bayes' Theorem and independence
- Special probability models for random experiments
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- Simple equally likely models
- Sampling without replacement from a finite populations
- Models for a sequence of independent sub-experiments, including Bernoulli trials, Binomial and Geometric models

- Fundamental discrete random variables: Binomial, Geometric, Negative Binomial, Hypergeometric, and Poisson random variables.
- The Poisson approximation of the Binomial and the Binomial approximation of the Hypergeometric
- Expected value, variance and standard deviation of a random variable and the properties of these quantities.
- Indicator variables and simple probability inequalities.

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