Level 5 Diploma in Foundations of Data Science Statistical Methods using Excel (951) 177 Credits

Unit: Introduction to Probability **Exam Paper No.:** 2	**Guided Learning Hours:** 300 **Number of Credits:** 30
Prerequisites: Business terms and Excel knowledge.	**Corequisites:** A pass or higher in Diploma in Analytics or equivalence.
Aim: One of the primary objectives in analytics is to measure the uncertainty associated with an **event** or **key performance indicator**. Analytics applications involve tasks such as predicting the probability of occurrence of an event, testing a hypothesis, and building models to explain variation in a variable of importance (outcome variable) to the business – such as customer satisfaction, demand for product/service, market share, profitability, return on investment (ROI) etc. The aim of the course is to ensure learners understand implementation of probability in real-world events. The topics covered include: • Events and sample space • Independent and dependent events • Mutually exclusive events • Data measurement scales • Random and continuous variables	
Required Materials: Recommended Learning Resources.	**Supplementary Materials:** Lecture notes and tutor extra reading recommendations.
Special Requirements: The unit requires a combination of lectures, demonstrations, discussions, and hands-on labs.	

Intended Learning Outcomes:	**Assessment Criteria:**
1. Understand the implementation of probability function and its use in measuring uncertainty associated with events or key performance indicators.	1.1 Define probability theory. 1.2 Describe association between event and sample space. 1.3 Demonstrate creating a probability tree diagram. 1.4 Be able to calculate complementary events. 1.5 Describe conditional probability. 1.6 Describe independent and dependent events. 1.7 Explore implementation of probability of mutual events.
2. Understand data classification at macro-level and different grouping and measurement scales.	2.1 Describe data classification categories. 2.2 Define structured and unstructured data. 2.3 Describe data measurement scale levels. 2.4 Demonstrate implementation of scales of measurements in building analytics model. 2.5 Describe random vs fixed effect model.
3. Understand the importance of random variables in probability and the use of discrete, continuous and mixed random variables.	3.1 Describe discrete variables. 3.2 Describe continuous variables. 3.3 Be able to calculate discrete random variables. 3.4 Describe Probability Mass Function (PMF). 3.5 Describe Probability Density Function (PDF). 3.6 Describe Cumulative Distribution Function (CDF).
4. Understand fundamental probability concepts in the building of Machine Learning (ML) models and Artificial Intelligence (AI).	4.1 Describe an experiment. 4.2 Be able to express Probability Frequency Distribution through a graph.

	4.3	Describe characteristics of probability and events.
	4.4	Explore permutations, combinations and variations as integral parts of combinatorics.
	4.5	Be able to use combinations and permutation formulas.
Methods of Evaluation: A 2½ hour essay written paper with 5 questions, each carrying 20 marks. Candidates are required to answer all questions. Candidates also undertake project/coursework in **Introduction to Probability** with a weighting of 100%.		

Recommended Learning Resources: Introduction to Probability

Text Books	• Introduction to Probability, Statistics and Random Processes by Hossein Pishro-Nik. ISBN-13 : 978-0990637202 • Introduction to Probability and Statistics by Seymour Lipschutz. ISBN-13 : 978-0071762496 • Statistics for Data Scientists: An Introduction to Probability, Statistics, and Data Analysis by Maurits Kaptein & Edwin van den Heuvel. ISBN-13 : 978-3030105303
Study Manuals 	BCE produced study packs
CD ROM 	Power-point slides
Software 	Excel