MODULE SPECIFICATION

Part 1: Information			
Module Title	Probability Theory and Mathematical Statistics [TSI]		
Module Code	UFCFWW-12-1	Level	Level 4
For implementation from	2021-22		
UWE Credit Rating	12	ECTS Credit Rating	6
Faculty	Faculty of Environment & Technology	Field	Computer Science and Creative Technologies
Department	FET Dept of Computer Sci & Creative Tech		
Module Type:	Standard		
Pre-requisites	None		
Excluded Combinations	None		
Co-requisites	None		
Module Entry Requirements	None		
PSRB Requirements	None		

Part 2: Description

Educational Aims: To acquaint students with theoretical foundations of probability theory and mathematical statistics and prepare them for construction and application of probabilistic models and empirical analysis of statistical data.

Outline Syllabus: Introduction to probability and statistics. Random experiments and random events. Operations with random events.

Probability space. Classical, geometrical, and statistical definitions of probability.

Probability of sum and product of random events. Conditional probability. Dependent and independent events.

The law of total probability. Bayes's rule.

Bernoulli trials, Bernoulli formula. Approximation: de Moivre-Laplace and Poisson theorems.

Random variables and their distributions.

Numerical characteristics of random variables: expected values, variance, moments, quartiles.

Discrete distributions: binomial, geometrical, Poisson.

Continuous distributions: uniform, exponential, normal.

Multivariate distributions. Theoretical covariance and correlation.

Law of large numbers in Bernoulli and Chebyshev's forms. The central limit theorem.

Mathematical statistics: main objectives and tasks. Descriptive statistics. Sampling.

Statistical estimation. Point estimates and their properties: unbiasedness, efficiency, consistency.

Interval estimates.

Testing of statistical hypotheses: the general algorithm, hypotheses about the expected value and the distribution law

Fundamentals of the sample correlation analysis.

Teaching and Learning Methods: Learning and teaching will be provided to students in three forms: lectures, practical probability calculus classes, and computer labs. During lectures, theoretical aspects of the course will be provided to students by the teaching staff. Lectures will be supported by presentation published and available to the students on e.tsi.lv under the module section. Also, additional materials, like publications on the internet, videos etc will be presented in e.tsi.lv.
During practical probability calculus classes, students receive a set of practical problems for every topic to perform. Several practical problems for every topic are explained during classes by a teaching assistant, while other problems are provided as a homework.
Computer labs are devoted to probability simulation and statistical data analysis using modern software such as R. Requirements' description for computer labs are provided, and students are expected to conduct the job independently outside the classes. The classes are reserved for requirement clarifications, problem discussion, and assessment.

Part 3: Assessment			
First Sit Components	**Final Assessment**	**Element weighting**	**Description**
In-class test - Component A		70 %	a series of in-class tests covering, Practical probability calculus, Theoretical examination, Proof of course theorems, as well as weekly MCQ
Portfolio - Component B		30 %	A series of tasks finding the solutions to a set a problems covering probability calculus as well as other topics covered within this module. students are required to include Source codes and supplementary reports on computer labs
Resit Components	**Final Assessment**	**Element weighting**	**Description**

In-class test - Component A		70 %	a series of in-class tests covering, Practical probability calculus, Theoretical examination, Proof of course theorems, as well as weekly MCQ
Portfolio - Component B		30 %	A series of tasks finding the solutions to a set a problems covering probability calculus as well as other topics covered within this module. students are required to include Source codes and supplementary reports on computer labs

Part 4: Teaching and Learning Methods

Learning Outcomes

On successful completion of this module students will achieve the following learning outcomes:

Module Learning Outcomes	**Reference**
Know the terminology of probability theory and mathematical statistics	MO1
Have clear understanding of probability theory axioms and theorems	MO2
Know the concept of discrete and continuous random variables	MO3
Know basic distribution laws (uniform, binomial, geometrical, Poisson, exponential, normal)	MO4
Understand theoretical foundations of point and interval statistical estimates	MO5
Understand principles of statistical hypotheses testing and be able to implement them on empirical data	MO6
Be able to apply different techniques for probability calculation	MO7
Have a skill of random variable construction and application	MO8
Be able to apply statistical sampling method	MO9
Be able to construct point and interval estimates for unknown population parameter	MO10
Be able to use modern software for solving problems of probability theory and mathematical statistic	MO11
Ability to recognize probabilistic problems in application areas and state them in a proper mathematical form	MO12
Preparedness for practical application of probability theory and mathematical statistics to professional problems	MO13
Ability to use professional software for probabilistic simulation and statistical data processing	MO14

Contact Hours

Scheduled Learning and Teaching Hours:	
Face-to-face learning	64
Total Scheduled Learning and Teaching Hours:	64
Hours to be allocated	120
Allocated Hours	64

Reading List

The reading list for this module can be accessed via the following link:

https://rl.talis.com/3/uwe/lists/D3BCD907-EA5F-548A-3E0E-C6E0C1068380.html?lang=en-gb&login=1

Part 5: Contributes Towards
This module contributes towards the following programmes of study: Computer Science and Software Development [Oct][FT][TSI][4yrs] BSc (Hons) 2020-21 Computer Science and Software Development [Feb][FT][TSI][4yrs] BSc (Hons) 2020-21