STUDENT AND ACADEMIC SERVICES

UWE Bristol | University of the West of England

MODULE SPECIFICATION

Part 1: Information			
Module Title	Mathematical Statistics		
Module Code	UFMFG9-15-2	Level	Level 5
For implementation from	2020-21		
UWE Credit Rating	15	ECTS Credit Rating	7.5
Faculty	Faculty of Environment & Technology	Field	Engineering, Design and Mathematics
Department	FET Dept of Engin Design & Mathematics		
Module type:	Standard		
Pre-requisites	Statistical Reasoning 2020-21		
Excluded Combinations	None		
Co- requisites	None		
Module Entry requirements	None		

Part 2: Description

Educational Aims: In this module students will be introduced to the theory which underpins many frequently employed statistical techniques.

Outline Syllabus: The syllabus includes:

Frequentist inference:
Estimation. Estimators as statistics, bias, consistency, variance, mean square error, Cramer-Rao lower bound. "Good estimators". Methods of maximum likelihood and moments. Sufficiency, information. MLE large sample properties; asymptotically normal. Interval estimation. Hypothesis testing. Rationale, size, power, one- and two-sided tests, Neyman-Pearson lemma; likelihood ratios; asymptotic properties of LRT.

Non-parametrics:
Development of combinatoric ideas under null hypothesis. Derivation of means and variance of non-parametric statistics.

Regression Analysis and Analysis of Variance:
Derivation of least squares line for simple linear regression. An introduction to bivariate regression and the bivariate normal distributions. Derivation of formulae for prediction intervals

and confidence intervals for predictions under simple linear regression. Matrix formulation for multiple linear regression. Derivation of additivity in one-way analysis of variance.

Bayesian Inference:
Prior knowledge, prior ignorance. Conjugate priors. Estimation and hypothesis testing. Empirical Bayes' methods. Decision theory. Loss functions, admissible decision criteria, minimax, maximin and Bayes' decision rules.

Teaching and Learning Methods: The module is delivered by means of lectorials. In the lectorials students will be able to ask questions and work through related exercises to reinforce and enhance student understanding of the taught material.

Students will be encouraged to develop critical awareness, intuition and interpretive skills in the application of statistical methodologies.

To prepare for assessment, students are expected to undertake self-directed learning in addition to the directed learning which supports taught classes.

Contact Hours:

Scheduled teaching hours takes the following form:

Class contact will take the form of lectorials where theory and practice are combined within the same session.

Contact time: 36 hours
Assimilation and development of knowledge: 54 hours
Coursework: 15 hours
Examination preparation: 45 hours
Total: 150 hours

Part 3: Assessment

Component A consists of an examination which assesses students' understanding of concepts and techniques as well as their ability to apply them and will include pre-seen scenarios as part of the exam preparation.

First Sit Components	Final Assessment	Element weighting	Description
Examination (Online) - Component A	✓	100 %	Online Written examination
Resit Components	Final Assessment	Element weighting	Description
Examination (Online) - Component A	✓	100 %	Online Written examination

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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
Show a detailed knowledge and understanding of the underlying principles of classical and Bayesian statistical methods	MO1

	Correctly identify and use a range of inferential and decision theory methods and understand their limitations	MO2
	Critically evaluate research literature in the field of statistical methods	MO3
	Communicate the results of problem solving and statistical investigations	MO4

Contact Hours	**Independent Study Hours:**	
	Independent study/self-guided study	114
	Total Independent Study Hours:	114
	Scheduled Learning and Teaching Hours:	
	Face-to-face learning	36
	Total Scheduled Learning and Teaching Hours:	36
	Hours to be allocated	150
	Allocated Hours	150
Reading List	*The reading list for this module can be accessed via the following link:* https://uwe.rl.talis.com/modules/ufmfg9-15-2.html	

Part 5: Contributes Towards
This module contributes towards the following programmes of study: Mathematics and Statistics {Foundation} [Sep][SW][Frenchay][5yrs] BSc (Hons) 2018-19 Mathematics and Statistics {Foundation} [Sep][FT][Frenchay][4yrs] BSc (Hons) 2018-19 Mathematics [Sep][FT][Frenchay][3yrs] BSc (Hons) 2019-20 Mathematics [Sep][SW][Frenchay][4yrs] BSc (Hons) 2019-20 Mathematics {Foundation} [Sep][SW][Frenchay][5yrs] BSc (Hons) 2018-19 Mathematics {Foundation} [Sep][FT][Frenchay][4yrs] BSc (Hons) 2018-19