MODULE SPECIFICATION

Part 1: Information			
Module Title	Mathematical Statistics		
Module Code	UFMFG9-15-2	Level	Level 5
For implementation from	2018-19		
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		
Contributes towards			
Module type:	Standard		
Pre-requisites	Statistical Reasoning 2018-19		
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.

Component B consists of an assignment designed to test understanding of the material covered in the first Semester.

First Sit Components	**Final Assessment**	**Element weighting**	**Description**
Written Assignment - Component B		25 %	Coursework
Examination - Component A	✓	75 %	Written examination (3 hours) (Final assessment)
Resit Components	**Final Assessment**	**Element weighting**	**Description**
Written Assignment - Component B		25 %	One coursework comparable with the coursework in the first assessment attempt.
Examination - Component A	✓	75 %	Written examination (3 hours)

Part 4: Teaching and Learning Methods

Learning Outcomes

On successful completion of this module students will be able to:

	Module Learning Outcomes
MO1	Show a detailed knowledge and understanding of the underlying principles of classical and Bayesian statistical methods
MO2	Correctly identify and use a range of inferential and decision theory methods and understand their limitations
MO3	Critically evaluate research literature in the field of statistical methods
MO4	Communicate the results of problem solving and statistical investigations

Contact Hours

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