

University of the West of Scotland

Module Descriptor

Session: 202425

Title of Module: Statistical Estimation and Inference			
Code: MATH09012	SCQF Level: 9 (Scottish Credit and Qualifications Framework)	Credit Points: 20	ECTS: 10 (European Credit Transfer Scheme)
School:	School of Computing, Engineering and Physical Sciences		
Module Co-ordinator:	Dr Raymond Carragher		
Summary of Module			
<p>This module extends the ideas in Statistics and probability from the level 8 module Probability and Statistics. The emphasis of the module is on survey sampling, point estimates and parametric and non-parametric hypothesis testing, specifically to prepare participants for research.</p> <p>Simple random sampling from a population will be introduced, then extended to different sampling methods, followed by sample parameter estimation topics such as distribution of the mean and estimation of ratio.</p> <p>Confidence intervals are reviewed and expanded from the level 8 module Probability and Statistics to include mean in normal population, point estimates and maximum likelihood estimation methods including generalised likelihood ratio tests.</p> <p>Hypothesis testing is introduced from first principles for parametric and non-parametric methods. The error types and p-values are discussed with respect to decision making. Suitable statistical package(s) will be used for visual understanding of the concept, calculations and predictions.</p> <p>The Graduate Attributes relevant to this module are given below:</p> <ul style="list-style-type: none"> • Academic: Critical thinker; Analytical; Inquiring; Knowledgeable; Problem-solver; Digitally literate; Autonomous. • Personal: Effective communicator; Motivated; Resilient. • Professional: Collaborative; Research-minded; Ambitious; Driven. 			

Module Delivery Method					
Face-To-Face	Blended	Fully Online	HybridC	Hybrid 0	Work-Based Learning
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
See Guidance Note for details.					

Campus(es) for Module Delivery						
The module will normally be offered on the following campuses / or by Distance/Online Learning: (Provided viable student numbers permit) (tick as appropriate)						
Paisley:	Ayr:	Dumfries:	Lanarkshire:	London:	Distance/Online Learning:	Other:
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Add name

Term(s) for Module Delivery					
(Provided viable student numbers permit).					
Term 1	<input type="checkbox"/>	Term 2	<input checked="" type="checkbox"/>	Term 3	<input type="checkbox"/>

Learning Outcomes: (maximum of 5 statements) These should take cognisance of the SCQF level descriptors and be at the appropriate level for the module. At the end of this module the student will be able to:	
L1	Apply a range of sampling methods, distributions and perform parameter estimation.
L2	Implement confidence interval estimations and perform relevant interpretation.
L3	Perform appropriate hypothesis tests for parametric and non-parametric methods.
L4	Use suitable computer software to perform and display appropriate analysis.

Employability Skills and Personal Development Planning (PDP) Skills	
SCQF Headings	During completion of this module, there will be an opportunity to achieve core skills in:
Knowledge and Understanding (K and U)	<p>SCQF Level 9</p> <p>Demonstrating a knowledge and understanding of concept of Sampling and basic methods of point estimates.</p> <p>Demonstrating basic awareness of the application of statistical hypothesis, as appropriate, to the solution of problems.</p>
Practice: Applied Knowledge and Understanding	<p>SCQF Level 9</p> <p>Using a range of standard techniques of decision making and the application of the hypothesis in research to solve standard</p>

	statistical problems, as appropriate, and making valid interpretations of these.	
Generic Cognitive skills	SCQF Level 9 Using a range of methods to analyse well-defined problems in relevant statistical contexts.	
Communication, ICT and Numeracy Skills	SCQF Level 9 Conceptualising and analysing problems informed by professional and research issues. Using suitable software to obtain, present and make valid interpretation of statistical problems and results, as appropriate.	
Autonomy, Accountability and Working with others	SCQF Level 9 Working autonomously to produce short reports on statistical problems. Collaborating with others in a small team to solve statistical problems.	
Pre-requisites:	Before undertaking this module the student should have undertaken the following:	
	Module Code: MATH08010	Module Title: Probability and Statistics
	Other:	Or equivalent
Co-requisites	Module Code:	Module Title:

*Indicates that module descriptor is not published.

Learning and Teaching	
In line with current learning and teaching principles, a 20-credit module includes 200 learning hours, normally including a minimum of 36 contact hours and maximum of 48 contact hours.	
Learning Activities During completion of this module, the learning activities undertaken to achieve the module learning outcomes are stated below:	Student Learning Hours (Normally totalling 200 hours): (Note: Learning hours include both contact hours and hours spent on other learning activities)
Lecture/Core Content Delivery	24
Tutorial/Synchronous Support Activity	12

Laboratory/Practical Demonstration/Workshop	12
Independent Study	152
	200 Hours Total

****Indicative Resources: (eg. Core text, journals, internet access)**

The following materials form essential underpinning for the module content and ultimately for the learning outcomes:

"Statistical Estimation and Inference" class notes on the University VLE.

"Introduction to Robust Estimation and Hypothesis Testing", RR Wilcox.

Suitable software, e.g. Excel, SPSS, R and Word.

(*N.B. Although reading lists should include current publications, students are advised (particularly for material marked with an asterisk*) to wait until the start of session for confirmation of the most up-to-date material)

Attendance and Engagement Requirements

In line with the [Student Attendance and Engagement Procedure](#): Students are academically engaged if they are regularly attending and participating in timetabled on-campus and online teaching sessions, asynchronous online learning activities, course-related learning resources, and complete assessments and submit these on time.

Equality and Diversity

The University's Equality, Diversity and Human Rights Procedure can be accessed at the following link: [UWS Equality, Diversity and Human Rights Code](#).

(N.B. Every effort will be made by the University to accommodate any equality and diversity issues brought to the attention of the School)

Supplemental Information

Divisional Programme Board	Engineering and Physical Sciences
Assessment Results (Pass/Fail)	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>

School Assessment Board	Computing, Engineering and Physical Sciences
Moderator	Dr Alan Walker
External Examiner	P Wilson
Accreditation Details	e.g. ACCA Click or tap here to enter text.
Changes/Version Number	1.07 Update to module summary and assessment components. Moderator updated.

Assessment: (also refer to Assessment Outcomes Grids below)
Assessment 1 – Coursework worth 30% of the final mark. This will involve appropriate statistical analyses and use suitable software, as required.
Assessment 2 – Class Test (Unseen, closed book) (70%)
(N.B. (i) Assessment Outcomes Grids for the module (one for each component) can be found below which clearly demonstrate how the learning outcomes of the module will be assessed. (ii) An indicative schedule listing approximate times within the academic calendar when assessment is likely to feature will be provided within the Student Module Handbook.)

Assessment Outcome Grids (See Guidance Note)

Component 1							
Assessment Type (Footnote B.)	Learning Outcome (1)	Learning Outcome (2)	Learning Outcome (3)	Learning Outcome (4)	Learning Outcome (5)	Weighting (%) of Assessment Element	Timetable Contact Hours
Class Test (unseen, closed book)	✓	✓	✓			70	2

Component 2							
Assessment Type (Footnote B.)	Learning Outcome (1)	Learning Outcome (2)	Learning Outcome (3)	Learning Outcome (4)	Learning Outcome (5)	Weighting (%) of Assessment Element	Timetable Contact Hours
Coursework				✓		30	
Combined Total for All Components						100%	2 hours