

H6STATS2: Statistics II

Module Code:	H6STATS2
Long Title	Statistics II APPROVED
Title	Statistics II
Module Level:	LEVEL 6
EQF Level:	5
EHEA Level:	Short Cycle
Credits:	10
Module Coordinator:	TONY DELANEY
Module Author:	TONY DELANEY
Departments:	School of Computing
Specifications of the qualifications and experience required of staff	This module requires a lecturer holding a Master's degree or higher, in a discipline with a significant statistics component. e.g Statistics, Mathematics, Economics.
Learning Outcomes	
<i>On successful completion of this module the learner will be able to:</i>	
#	Learning Outcome Description
LO1	Apply appropriate statistical inference techniques to the analysis of data across a variety of domains.
LO2	Source data ethically and communicate statistical results in a comprehensive and professional manner.
LO3	Compare and contrast alternative models to assist with forecasting.
LO4	Identify patterns in data and implement dimension reduction techniques.
LO5	Assess issues of effect size and statistical power.
Dependencies	
Module Recommendations	
No recommendations listed	
Co-requisite Modules	
No Co-requisite modules listed	
Entry requirements	Learners should have attained the knowledge, skills and competence gained from stage 1 of the BSc (Hons) in Data Science

H6STATS2: Statistics II

Module Content & Assessment			
Indicative Content			
Review of Basic Statistical Concepts Fundamentals of Probability . Sampling . Estimation & confidence intervals. Hypothesis testing & t-tests . ANOVA . Non-parametric tests. Correlation & basic regression.			
Ethics in sourcing and analysis of data Data Sources. Ethics in data sourcing. Maintenance of data security			
Topics in Regression Analysis I Principles of regression model building. Non-linearity of data. Transformations. Correlation of error terms			
Topics in Regression Analysis II Heteroscedasticity in regression models. Diagnostics for leverage and influence. Multicollinearity			
Logistic Regression & Linear Discriminant Analysis I Principles behind the binary logistic regression model. Odds & odds ratios. Estimating logistic regression coefficients. Wald statistic – contribution of predictors. Prediction using logistic regression			
Logistic Regression & Linear Discriminant Analysis II Multinomial logistic regression. Linear discriminant analysis			
PCA/Factor Analysis Applications of PCA & exploratory factor analysis. Suitability of data for PCA / factor analysis. Interpretation of principal components. Factor rotation. Clustering methods			
Multivariate Analysis of Variance (MANOVA) ANOVA vs MANOVA. Applications of MANOVA . SSCP matrices. MANOVA test statistics . Interpretation of MANOVA software output			
Multilevel Linear Models I Hierarchical data. Theory of multilevel linear models			
Multilevel Linear Models II Building a multilevel model. Assessing the fit of multilevel linear models			
Effect Size & Statistical Power Effect size in research. Effect size metrics. Statistical power and sample size. Statistical Power analysis			
Critical appraisal of null hypothesis significance testing Appropriate use of NHST in research. Reporting test results. Examples of misuse of NHST			
Assessment Breakdown			%
Coursework			50.00%
End of Module Assessment			50.00%
Assessments			
Full Time			
Coursework			
Assessment Type:	Continuous Assessment	% of total:	Non-Marked
Assessment Date:	n/a	Outcome addressed:	1,2,3,4,5
Non-Marked:	Yes		
Assessment Description: Formative assessment will be undertaken utilising exercises and short answer questions during certain tutorials. In class discussions will be undertaken on contemporary topics. Feedback will be provided individually or as a group in oral format.			
Assessment Type:	Continuous Assessment	% of total:	50
Assessment Date:	n/a	Outcome addressed:	1,2
Non-Marked:	No		
Assessment Description: Learners will be asked to estimate models using elements of multiple regression, logistic regression and/or multilevel linear model techniques. The project will focus on practical application of models. Project data must be sourced ethically and an application for ethical approval made where necessary in accordance with school policy			
Assessment Type:	Easter Examination	% of total:	50
Assessment Date:	n/a	Outcome addressed:	1,2,3,4,5
Non-Marked:	No		
Assessment Description: The examination will be in the region of two hours in duration and may include a mix of: theoretical, applied and interpretation questions. Assessment of LO1 and LO2 will cover theory and conceptual understanding.			
No End of Module Assessment			
No Workplace Assessment			
Reassessment Requirement			
Repeat examination Reassessment of this module will consist of a repeat examination. It is possible that there will also be a requirement to be reassessed in a coursework element.			
Reassessment Description By examination.			

H6STATS2: Statistics II

Module Workload				
Module Target Workload Hours 0 Hours				
Workload: Full Time				
Workload Type	Workload Description	Hours	Frequency	Average Weekly Learner Workload
Lecture	Classroom & Demonstrations (hours)	24	Per Semester	2.00
Tutorial	Other hours (Practical/Tutorial)	24	Per Semester	2.00
Independent Learning	Independent learning (hours)	202	Per Semester	16.83
Total Weekly Contact Hours				4.00

Module Resources	
<i>Recommended Book Resources</i>	
Field, A.. (2018), Discovering Statistics using SPSS Statistics (5th ed), SAGE Publications, London. Heumann, C. & Schomaker Shalabh, M.. (2016), Introduction to Statistics and Data Analysis with Exercises, Solutions and Applications in R, Springer, Switzerland. Moore, D., McCabe, G., & Craig, B.. (2014), Introduction to the Practice of Statistics, 8e, WH Freeman & Co, New York. Pallant, J.. (2016), SPSS Survival Manual (6 ed), McGraw Hill, United Kingdom.	
<i>Supplementary Book Resources</i>	
Cortinhas, C. & Black, K.. (2012), Statistics for Business & Economics, Wiley, United Kingdom. Foster, J., Barkus, E. & Yavorsky, C.. (2006), Understanding and Using Advanced Statistics, SAGE Publications, London. James, G., Witten, D. Hastie, T. & Tibshirani, R.. (2013), An Introduction to Statistical Learning with applications in R, Springer, New York.	
<i>This module does not have any article/paper resources</i>	
<i>This module does not have any other resources</i>	
Discussion Note:	