SCIE: Case Studies in Data Science

Module Title:	Case Studies in Data Science
Language of Instruction:	English

Credits:	5

NFQ Level:	8

Module Delivered In	4 programme(s)

Teaching & Learning Strategies:	The delivery of the material will be mainly in the laboratory setting.

Module Aim:	The aim of the subject is to familiarise students with various applications of data science to create business value. The emphasis is to enable the student to apply the statistical learning and modelling techniques to develop an insight/solution to support business decisions.

Learning Outcomes	
On successful completion of this module the learner should be able to:	
LO1	Critically evaluate and apply a range of adequate statistical learning techniques to solve problem within a business context
LO2	Communicate and critically evaluate the outcomes of the application of data science methods to a chosen data set

Pre-requisite learning
Module Recommendations *This is prior learning (or a practical skill) that is recommended before enrolment in this module.*
No recommendations listed
Incompatible Modules *These are modules which have learning outcomes that are too similar to the learning outcomes of this module.*
No incompatible modules listed
Co-requisite Modules
No Co-requisite modules listed
Requirements *This is prior learning (or a practical skill) that is mandatory before enrolment in this module is allowed.*
No requirements listed

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Module Content & Assessment

Indicative Content
Data Science: Introduction AI, Business Analytics, Data Analytics, Data Science, Machine Learning - concepts and definitions
Statistics, Statistical Modelling and Machine Learning Statistics vs. Statistical Modelling vs. Machine Learning
Introduction to R & RStudio (IDE) environments R vs Python, RStudio: scripts, workflow, packages: ggplot,plotly, tidyverse (dplyr,readr, purrr,forcats,stringr), plots tab: Graphs export, 3D graphs
Seatle House Prices Case Study: Descriptive vs Predictive Analytics Exploratory Data Analysis, Visualisation,and Predictive Modelling (Regression Analysis)
Car engines and the polution level: Case Study Introducing Basic Inferential Statistics Concept: Confidence Intervals, Logarithm Transformation, Significance Test, The Power of the test
Twitter Data Case Study: Sentiment Analysis The tidy text format, Sentiment Analysis with tidy data, data-type variables and their transformation with Lubridate,dplyr; Regular Expression, Comparing the odds ratios of words;
Customer Segmentation Case Study Exploratory Data Analysis, Data Visualisation, k-means clustering, Determining the Optimal number of Clusters: Elbow, Silhuette,and Gap methods
Turists and their needs Case Study: Time Series Analysis Identify the Time Series, Manipulating and Visualising Time Series; Calculate Time Series trends, Assessing Time Series Trends
Wine market analysis - Case study Dimiensionality Reduction: the rationale and application, The concept of Principal Component Analysis, Visualising PCA
Student loan default Case Study Logistic Regression, The concept of binary classification, application assumptions, the Logit model as part of the GLM family, Assessing Coefficients; caret package
Marketing Data Case Study Experimental Design, T-test, ANOVA, F-test, Hypothesis Testing, Post-Hoc testing

Assessment Breakdown	%
Continuous Assessment	100.00%

Continuous Assessment

Assessment Type	*Assessment Description*	*Outcome addressed*	*% of total*	*Assessment Date*
Case Studies	Students will analyse a case study to provide solution to a stated problem by applying chosen statistical learning methods.	1,2	100.00	Week 12

No Project

No Practical

No End of Module Formal Examination

SETU Carlow Campus reserves the right to alter the nature and timings of assessment

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Module Workload

Workload: Full Time		
Workload Type	*Frequency*	*Average Weekly Learner Workload*
Laboratory	12 Weeks per Stage	3.00
Independent Learning	15 Weeks per Stage	5.93
	Total Hours	125.00

Module Delivered In

Programme Code	Programme	Semester	Delivery
CW_KCCGD_B	Bachelor of Science (Honours) in Computer Games Development	8	Group Elective 1
CW_KCIAD_B	Bachelor of Science (Honours) in Computing in Interactive Digital Art and Design	8	Elective
CW_KCCYB_B	Bachelor of Science (Honours) in Cyber Crime and IT Security	8	Elective
CW_KCSOF_B	Bachelor of Science (Honours) in Software Development	8	Group Elective 1