Title:	Applied Stats & Probability APPROVED
Long Title:	Applied Stats & Probability

Module Code:	STAT8006	**Duration:**	1 Semester

Credits:	5
NFQ Level:	Advanced
Field of Study:	Statistics
Valid From:	Semester 1 - 2018/19 (September 2018)
Module Delivered in	2 programme(s)
Next Review Date:	March 2023
Module Coordinator:	David Goulding
Module Author:	Sarah Murphy
Module Description:	This module will apply statistics and probability distributions to modern day problems. It will develop graphical visualisation methods, probability theory and distributions. The module will develop knowledge, skill and competence of sampling theory and hypothesis testing using both parametric and non parametric methods.

Learning Outcomes	
On successful completion of this module the learner will be able to:	
LO1	Graphically display and numerically summarise data using methods of descriptive statistics.
LO2	Apply the rules of probability and use probability models for data analysis.
LO3	Compute and interpret point and interval estimates of population parameters. Determine required sample sizes. Describe the structure and compute statistical tests of hypothesis.
LO4	Distinguish between parametric and non parametric methods and decide when non parametric tests should be applied.
LO5	Analyse statistical output from statistical packages.

Pre-requisite learning

Module Recommendations
This is prior learning (or a practical skill) that is strongly recommended before enrolment in this module. You may enrol in this module if you have not acquired the recommended learning but you will have considerable difficulty in passing (i.e. achieving the learning outcomes of) the module. While the prior learning is expressed as named MTU module(s) it also allows for learning (in another module or modules) which is equivalent to the learning specified in the named module(s).

13586	STAT8006	Applied Stats & Probability

Incompatible Modules
These are modules which have learning outcomes that are too similar to the learning outcomes of this module. You may not earn additional credit for the same learning and therefore you may not enrol in this module if you have successfully completed any modules in the incompatible list.

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. You may not enrol on this module if you have not acquired the learning specified in this section.

No requirements listed

Module Content & Assessment

Indicative Content
Data collection and presentation Collection and presentation of data. Basic descriptive statistics (both graphical and numerical).
Probability Relative frequency and axiomatic definitions. Laws of probability, conditional probability, independent and mutually exclusive events.
Probability distributions Random variables. Discrete and continuous distributions. Properties of probability density and cumulative density functions. The importance and the uses of the Normal distribution. Use of statistical tables.
Sampling and Statistical Inference Sampling distributions of proportions and means. Calculate the required sample size to obtain confidence intervals of required length for a single parameter. Confidence intervals and hypothesis tests for: one-sample mean and proportion; difference between two-sample means and proportions.
Non Parametric methods Non-parametric versus parametric methods. Typical non-parametric methods: The Sign test, Mann-Whitney Test, Wilcoxon, Spearman's Rank correlation coefficient.

Assessment Breakdown	%
Course Work	40.00%
End of Module Formal Examination	60.00%

Course Work

Assessment Type	*Assessment Description*	*Outcome addressed*	*% of total*	*Assessment Date*
Practical/Skills Evaluation	Analyse a data set using descriptive statistics. Submit a report which explains all concepts and procedures used in the analysis.	1,5	20.0	Week 5
Practical/Skills Evaluation	Conduct appropriate hypothesis tests on various data sets. Submit a report which explains all procedures used in the analysis.	3,5	20.0	Week 11

End of Module Formal Examination

Assessment Type	*Assessment Description*	*Outcome addressed*	*% of total*	*Assessment Date*
Formal Exam	End-of-Semester Final Examination	1,2,3,4,5	60.0	End-of-Semester

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.

The institute reserves the right to alter the nature and timings of assessment

Module Workload

Workload: Full Time				
Workload Type	*Workload Description*	*Hours*	*Frequency*	*Average Weekly Learner Workload*
Lecture	Delivery of Module Content	2.0	Every Week	2.00
Lab	Statistical package lab	2.0	Every Week	2.00
Independent & Directed Learning (Non-contact)	Worksheets	3.0	Every Week	3.00
			Total Hours	7.00
			Total Weekly Learner Workload	7.00
			Total Weekly Contact Hours	4.00

Workload: Part Time				
Workload Type	*Workload Description*	*Hours*	*Frequency*	*Average Weekly Learner Workload*
Lecture	Delivery of Module Content	2.0	Every Week	2.00
Lab	Statistical package lab	1.0	Every Week	1.00
Independent & Directed Learning (Non-contact)	Worksheets	4.0	Every Week	4.00
			Total Hours	7.00
			Total Weekly Learner Workload	7.00
			Total Weekly Contact Hours	3.00

Module Resources

Recommended Book Resources

- **Mario F. Triola 2012, *Elementary Statistics*, 12th Ed. [ISBN: 9780321836960]**
- **Michael J. Crawley 2012, *The R Book*, 2nd Ed. [ISBN: 9780470973929]**
- **Tadhg L. O'Shea 2013, *Essential Statistics for Researchers* [ISBN: 9780957505902]**
- **Perry R. Hinton 2004, *Statistics Explained: A Guide for Social Science Students*, 2nd Ed. [ISBN: 9780415332859]**
- **David S. Moore, George P. McCabe, Bruce A. Craig 2016, *Introduction to the Practice of Statistics*, 9th Ed. [ISBN: 9781319013387]**

Supplementary Book Resources

- **Douglas C. Montgomery, George C. Runger 2013, *Applied Statistics and Probability for Engineers*, 6th Ed. [ISBN: 9781118539712]**

This module does not have any article/paper resources

Other Resources

- **Website: *R Studio***
  http://www.rstudio.com
- **Website: *OpenIntro Statistics***
  http://www.openintro.org/stat
- **Website: *R Bloggers***
  http://www.r-bloggers.com

Module Delivered in

Programme Code	Programme	Semester	Delivery
CR_SDAAN_8	Higher Diploma in Science in Data Science & Analytics	1	Mandatory
CR_SDAAN_9	Master of Science in Data Science & Analytics	1	Mandatory