



Title:	Biostatistics and Probability	APPROVED
Long Title:	Biostatistics and Probability	
Module Code:	STAT6013	Duration: 1 Semester
Credits:	5	
NFQ Level:	Fundamental	
Field of Study:	Statistics	
Valid From:	Semester 1 - 2017/18 (September 2017)	
Module Delivered in	9 programme(s)	
Module Coordinator:	Brigid Lucey	
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Module Description:	This module provides a treatment of descriptive statistics, probability distributions, and regression and correlation.	
Learning Outcomes		
<i>On successful completion of this module the learner will be able to:</i>		
LO1	Apply the methods of descriptive statistics to organise, summarise, present and analyse data.	
LO2	Choose, use, and interpret summary statistics.	
LO3	Calculate probabilities using the basic rules of probability and solve related applied problems.	
LO4	Identify common probability distributions, in particular the normal distribution, and calculate probabilities associated with them.	
LO5	Determine and use the regression line for a set of bivariate data.	
Pre-requisite learning		
Module Recommendations		
<i>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 CIT module(s) it also allows for learning (in another module or modules) which is equivalent to the learning specified in the named module(s).</i>		
13080	MATH6056	Maths for Biological Sciences
Incompatible Modules		
<i>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.</i>		
No incompatible modules listed		
Co-requisite Modules		
No Co-requisite modules listed		
Requirements		
<i>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.</i>		
No requirements listed		

Module Content & Assessment

Indicative Content

Data Collection and Organisation

Qualitative and quantitative data and variables. Collection & presentation of data: tallies, frequency distributions, histograms, frequency curves, ogives, stem & leaf plots. Various patterns and their causes, normal, skew, truncated, bimodal. Population and sample, sampling techniques.

Summary Statistics

Measures of central tendency and measures of dispersion. Box plots, outliers. Error bars. Coefficient of variation. Coefficient of skew.

Fundamentals of Probability

Definitions of probability, calculating probabilities, the complementary event. Compound events, mutually exclusive events. Independence of events, conditional probability. Introduction to Bayes Theorem.

Probability Distributions

Definition of a random variable and its associated probability distribution function. Examples of discrete random variables. Overview of common discrete probability distributions, to include the Binomial Distribution. Continuous random variables, probability density functions. The Normal (Gaussian) Distribution. Use of tables. Applications of the Normal Distribution in the Biological Sciences. Indicators of normality.

Regression and Correlation

Scatterplots, correlation coefficient, coefficient of determination, regression equation, prediction: interpolation and extrapolation, the method of least squares. Discussion of association versus cause-and-effect.

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
Short Answer Questions	In-class assessment on descriptive statistics	1,2	20.0	Week 5
Short Answer Questions	In-class test - probability	2,3	20.0	Week 9

End of Module Formal Examination

Assessment Type	Assessment Description	Outcome addressed	% of total	Assessment Date
Formal Exam	End-of-semester 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				
<i>Workload Type</i>	<i>Workload Description</i>	<i>Hours</i>	<i>Frequency</i>	<i>Average Weekly Learner Workload</i>
Lecture	Exposition of theory with illustrative concrete examples	3.0	Every Week	3.00
Tutorial	Questions and answers on lecture content, problem solving under guidance of lecturer	1.0	Every Week	1.00
Independent & Directed Learning (Non-contact)	Study of lecture material and exercise sheets	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				
<i>Workload Type</i>	<i>Workload Description</i>	<i>Hours</i>	<i>Frequency</i>	<i>Average Weekly Learner Workload</i>
Lecture	Exposition of theory with illustrative concrete examples	3.0	Every Week	3.00
Tutorial	Questions and answers on lecture content, problem solving under guidance of lecturer	1.0	Every Week	1.00
Independent & Directed Learning (Non-contact)	Study of lecture material and exercise sheets	3.0	Every Week	3.00
Total Hours				7.00
Total Weekly Learner Workload				7.00
Total Weekly Contact Hours				4.00

Module Resources

Recommended Book Resources

- D.Bowers 2014, *Medical Statistics from Scratch*, 3rd Ed., Wiley [ISBN: 978111851938]
- Martin Bland 2015, *An Introduction to Medical Statistics*, 4th Ed., OUP [ISBN: 97801995899]
- Bernard Rosner 2011, *Fundamentals of Biostatistics*, 7th Ed., Cengage [ISBN: 978053873349]

Supplementary Book Resources

- Alicia Sevilla & Kay Somers 2013, *Quantitative Reasoning: Tools for Today's Informed Citizen*, 2nd Ed., Key College Publishing USA [ISBN: 97811184068]
- D.S. Moore, G.P. McCabe & B.A. Craig 2015, *Introduction to the Practice of Statistics*, 8th Ed., Macmillan [ISBN: 978131901338]

This module does not have any article/paper resources

Other Resources

- Website: CIT Department of Mathematics *CIT MathsOnline*, Accessible via CIT Blackboard
<https://idp.cit.ie/idp/Authn/UserPasswor d>
- Website: Franco Vivaldi 2009, *Essential Mathematics Web-book*
<http://www.maths.qmul.ac.uk/~fv/books/em/>
- Website: Eric Weisstein *Wolfram MathWorld*
<http://www.mathworld.wolfram.com>
- Website: *Wolfram Alpha*
<http://www.wolframalpha.com>
- Website: *Central Statistics Office*
<http://www.cso.ie>
- Website: *National Cancer Registry of Ireland*
<http://www.ncri.ie/>

Module Delivered in

Programme Code	Programme	Semester	Delivery
CR_SAGBI_8	<u>Bachelor of Science (Honours) in Agri-Biosciences</u>	2	Mandatory
CR_SHERB_8	<u>Bachelor of Science (Honours) in Herbal Science</u>	2	Elective
CR_SNHSC_8	<u>Bachelor of Science (Honours) in Nutrition and Health Science</u>	2	Mandatory
CR_SPHBI_8	<u>Bachelor of Science (Honours) in Pharmaceutical Biotechnology</u>	2	Mandatory
CR_SAGBI_7	<u>Bachelor of Science in Agri-Biosciences</u>	2	Mandatory
CR_SBIBI_7	<u>Bachelor of Science in Applied Biosciences and Biotechnology</u>	2	Mandatory
CR_SFSTE_7	<u>Bachelor of Science in Food and Health Science</u>	2	Mandatory
CR_SCEBS_8	<u>Common Entry Biological Sciences</u>	2	Mandatory
CR_SBIOS_6	<u>Higher Certificate in Science in Applied Biosciences</u>	2	Mandatory