



Module Details

Short Title:	Biostatistics APPROVED		
Full Title:	Biostatistics		
Module Code:	STAT9003	NFQ Level:	Expert
		ECTS Credits:	10.0
Valid From:	Semester 1 - 2011/12 (September 2011)		
Module Coordinator:	AINE NI SHE		
Module Author:	AINE NI SHE		
Description:	For any undergraduate or graduate science student, one of the most fundamental skills they must acquire is the ability to apply appropriate statistical techniques to their particular research area. This module will provide such students with the skills necessary to design experiments, apply appropriate statistical methods and correctly interpret experimental data.		
Learning Outcomes:			
<i>On successful completion of this module the learner will be able to</i>			
<ol style="list-style-type: none"> 1. Apply appropriate statistical methods to biological science problems. 2. Interpret the results of statistical analyses performed by a software package or presented in research papers. 3. Choose an experimental design appropriate to a given problem and perform the correct statistical analysis on the resultant data. 4. Apply regression techniques to the analysis of experimental data to identify relationships between variables. 5. Understand the difference between parametric and non-parametric methods and when the most commonly used non-parametric methods should be applied. 			
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>			
No recommendations listed			
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			
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			
Co-requisites			
No co-requisites listed			



Module Content & Assessment

Indicative Content

- **The Normal Distribution**
Features of the normal distribution and the relevance of the normal distribution to biological data.
- **Statistical Inference**
Sampling distributions. Estimation and significance testing: procedures involving normal, t, F and Chi-square distributions. Analysis of variance.
- **Regression Analysis**
Least squares. The simple linear model. Analysis of residuals, coefficient of determination. Analysis of variance for regression. Confidence limits for prediction. Introduction to multiple regression: model selection procedures. Sensitivity, Specificity, Receiver Operating Characteristic (ROC) Curves.
- **Design of Experiments**
Experimental design for analysis of variance. Factorial experiments: 2-Factor factorial experiments, factorial experiments with more than 2 factors, factorial experiments with split plots. Determining the number of replicates.
- **Non-Parametric Methods**
Non-Parametric versus Parametric methods. Typical non-parametric methods: The Sign test, Kruskal-Wallis analysis of ranks, Kendall's rank correlation coefficient.

Assessment Breakdown	%
Course Work	40.0%
End of Semester Formal Examination	60%

	Outcome addressed	% of total	Assessment Date
Formal End-of-Semester Examination	1,2,3,4,5	60%	Semester End

Coursework Breakdown				
Type	Description	Outcome addressed	% of total	Assessment Date
Short Answer Questions	Test learning outcomes.	1,2,4	20.0	Week 6
Short Answer Questions	Test learning outcomes.	3,5	20.0	Week 12

Reassessment Requirement
Repeat examination <i>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.</i>

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



Module Workload & Resources

Workload <i>Type</i>	Full-time			
	<i>Description</i>	<i>Hours</i>	<i>Frequency</i>	<i>Average Weekly Learner Workload</i>
Lecture	Lecture	4.0	Every Week	4.00
Lab	Lab	2.0	Every Week	2.00
Independent & Directed Learning (Non-contact)	No Description	8.0	Every Week	8.00
Total Weekly Learner Workload				14.00
Total Weekly Contact Hours				6.00

Resources

Recommended Book Resources

- **Jerrold H. Zar 2010, *Biostatistical analysis*, 5th Ed., Prentice Hall Upper Saddle River, N.J. [ISBN: 9780132065023]**

Supplementary Book Resources

- **Thomas Glover, Kevin Mitchell, 2008, *An Introduction to Biostatistics*, 2nd Ed., Waveland Press, Inc. [ISBN: 1577665805]**
- **Marc M. Triola, Mario F. Triola 2006, *Biostatistics for the biological and health sciences*, Pearson Higher Education [ISBN: 9780321546494]**