MODULE SPECIFICATION PROFORMA

Module Title:	Introduction to Experimental Design and Mathematical Analysis	**Level**:	3	**Credit Value**:	20

Module code:	LND306	**Is this a new module?**	No	**Code of module being replaced**:	N/A

Cost Centre(s):	GAHT	**JACS3 code**:	N/A

With effect from:	November 16

School:	Social & Life Sciences – Land based	**Module Leader:**	Dr David Skydmore

Scheduled learning and teaching hours	50 hrs
Guided independent study	150 hrs
Placement	0 hrs
Module duration (total hours)	200 hrs

Programme(s) in which to be offered	Core	Option
BSc (Hons) Wildlife and Plant Biology (including Foundation Yr)	✓	☐
BSc (Hons) Equine Science and Welfare Management (including Foundation Yr)	✓	☐
FdSc Animal Studies (including Foundation Yr)	✓	☐
BSc (Hons) Forensic Science (including Foundation Yr)	✓	☐
BSc (Hons) Geography, Ecology and Environment (including Foundation Yr)	✓	☐
BSc (Hons) Chemistry with Green Nanotechnology (including Foundation Yr)	✓	☐

Pre-requisites
None

Office use only

Initial approval: September 14

APSC approval of modification: November 16 Version: 2

Have any derogations received LTQC approval? Yes ☐ No ☐ N/A ✓

If new module, remove previous module spec from directory? Yes ☐ No ☐

Module Aims

- To appreciate the use of scientific methods and concepts
- To understand the principles of experimental design
- To appreciate methods in the interpretation and analysis of data

Intended Learning Outcomes

Key skills for employability

KS1	Written, oral and media communication skills
KS2	Leadership, team working and networking skills
KS3	Opportunity, creativity and problem solving skills
KS4	Information technology skills and digital literacy
KS5	Information management skills
KS6	Research skills
KS7	Intercultural and sustainability skills
KS8	Career management skills
KS9	Learning to learn (managing personal and professional development, self-management)
KS10	Numeracy

At the end of this module, students will be able to		Key Skills	
1	Explain and apply mathematical notation and algebraic expressions.	KS1	KS10
		KS2	
		KS6	
2	Draw graphs and determine their gradients.	KS1	KS10
		KS3	
		KS4	
3	Interpret basic statistics and examples of probability and demonstrate their applications in science	KS1	KS6
		KS4	KS10
		KS5	
4	Design a laboratory experiment and collect observations	KS1	KS6
		KS3	KS10
		KS5	
5	Apply principles in to the analysis and interpretation of data	KS1	KS10
		KS3	
		KS6	

Transferable skills and other attributes

- Problem solving
- Mathematical applications
- Design, analysis, and synthesis
- ICT
- Presentation skills

Derogations

None

Assessment:

Assessment One: is by means of a Presentation of a data analysis and interpretation on evidence presented in a textbook or scientific journal.

Assessment Two: Exam on mathematical/statistical problems. This will be conducted as an open book assessment

Assessment number	Learning Outcomes to be met	Type of assessment	Weighting (%)	Duration (if exam)	Word count (or equivalent if appropriate)
1	3,4,5	Presentation	50	10 mins	
2	1,2,3	Examination	50	1.5 hrs	

Learning and Teaching Strategies:

The module will be presented to students through a series of lectures and learning reinforced through module tutor guided and self-directed study and interactive problem-solving tutorial sessions utilising laboratory equipment where appropriate.

Formative assessment involves tutorial questions and summative assessment is by In Class Test and presentation.

Syllabus outline:

Use of theories and models to explain observations and cause and effect in science

Numbers, scientific notation and significant figures.
Algebra and manipulation of algebraic expressions.
Powers, indices, exponentials and logarithms.
Some simple rules of differentiation.
Integration: reversing differentiation.

Experimental design
- Dependent and independent variables
- Accuracy and precision
- Sampling

Replication
Reproducibility

Data analysis
Producing and interpreting graphs
Averages
Percentages
Introduction to probability.
Use of statistics in experimental analysis
Normal distribution.
Basic t-test.

Use of ICT in data analysis

Bibliography:

Essential reading

Ruxton, G.D. & Colegrave, N. (2016) *Experimental Design for the Life Sciences*. Oxford: Oxford University Press

Other indicative reading

Lawler, G. (2011) *Understanding Maths: Basic Mathematics Explained.* 4th ed. Conway:Aber Publishing.

Stroud, K.A. & Booth, D.J. (2009) *Foundation Mathematics*. London: Palgrave Macmillan

Page, S., Berry, J. & Hampson, H. (2002) *Mathematics - A Second Start.* 2nd ed. Cambridge: Woodhead Publishing.