Northeastern University London

Maths, Statistics, Experimental Protocol and Analysis Course Descriptor

Course Title	Maths, Statistics, Experimental Protocol and Analysis	Faculty	EDGE Innovation Unit (London)
Course code	NCHNAP491	Course Leader	Professor Scott Wildman (interim)
Credit points	15	Teaching Period	This course will typically be delivered over a 6-week period.
FHEQ level	4	Date approved	Sep 2021
Compulsory/ Optional	Compulsory	Date modified	
Pre-requisites	None		
Co-requisites	None		

Course Summary

This course examines the mathematical and statistical principles that are an essential component of the professional laboratory/technician scientist's knowledge and skills, such as units, dimensions, exponential logarithms, statistical techniques, probability distributions, sampling, significance testing and confidence limits, regression and correlation. Learners will apply their mathematical knowledge to scientific data. The course then examines the scientific method and experimental protocol, i.e. experimental design and procedure, reproducibility of results, mathematically and statistically robust analysis, clear reporting and hypothesis testing.

Course Aims

- To train learners to understand and apply principles, theory and techniques that underpin experimental protocol.
- To employ rigorous and exacting methodologies to record and detail scientific experiments and research.
- For learners to have a solid grounding in essential mathematical and statistical techniques.

Learning Outcomes

On successful completion of the course, learners will be able to:

Knowledge and Understanding

K1a	Understand the principles, theory and techniques that underpin experimental protocol.
K2a	Understand how to use statistical and mathematical techniques to inform experimental protocol and analyse results.
K3a	Understand the principles, theory and concepts of the mathematical and statistical foundations of data analysis for scientific application.

Subject Specific Skills

S1a	Solve numerical problems using a range of mathematical, statistical and analytical methods.
S2a	Develop a simple experimental protocol based on evidence-based analysis.
S3a	Use mathematical and statistical techniques to analyse data and make conclusions.

Transferable and Professional Skills

T1a	Apply problem-solving skills to develop solutions to problems.
T2a	Communicate analysis clearly and logically.
T3ai	Promote professionalism in data analysis work.
T3aii	Display a developing technical proficiency in written English and an ability to communicate clearly and accurately in structured and coherent pieces of writing.

Teaching and Learning

This is an e-learning course, taught throughout the year.

This course can be offered as a standalone short course.

Teaching and learning strategies for this course will include:

- Online learning
- Online discussion groups
- Online assessment

Course information and supplementary materials will be available on the University's Virtual Learning Environment (VLE).

Learners are required to attend and participate in all the formal and timetabled sessions for this course. Learners are also expected to manage their self-directed learning and independent study in support of the course.

The course learning and teaching hours will be structured as follows:

- Off-the-job learning and teaching (6 days x 7 hours) = 42 hours
- One-the-job learning (12 days x 7 hours) = 84 hours (e.g. 2 days per week for 6 weeks)
- Private study (4 hours per week) = 24 hours

Total = 150 hours

Workplace assignments (see below) will be completed as part of on-the-job learning.

Assessment

Formative

Learners will be formatively assessed during the course by means of set assignments. These will not count towards the final degree but will provide learners with developmental feedback.

Summative

Assessment will be in two forms:

AE	Assessment Type	Weighting	Online submission	Duration	Length
1	Multiple Choice Exam	40%	Yes	1 hour	-
2	Set Exercises (problem-solving)	60%	Yes	Requiring on average 20 – 25 hours to complete	-

Feedback

Learners will receive formal feedback in a variety of ways: written (via email or VLE correspondence) and indirectly through online discussion groups. Learners will also

attend a formal meeting with their Academic Mentor (and for apprentices, including their Line Manager). These bi or tri-partite reviews will monitor and evaluate the learner's progress.

Feedback is provided on summatively assessed assignments and through generic internal examiners' reports, both of which are posted on the VLE.

Indicative Reading

Note: Comprehensive and current reading lists for courses are produced annually in the Course Syllabus or other documentation provided to learners; the indicative reading list provided below is used as part of the approval/modification process only.

Books

- Robeva, R., & Hodge, Terrell. (2013). *Mathematical Concepts and Methods in Modern Biology* (1st edition).
- Clarke, G. M. (1994). *Statistics and experimental design : an introduction for biologists and biochemists* (3rd ed.). London : E. Arnold ; New York : Halsted Press.
- Roff, D. A. (2006). *Introduction to computer-intensive methods of data analysis in biology*. Cambridge, UK ; New York : Cambridge University Press.

Journals

Learners are encouraged to read material from relevant journals on maths, statistics, experimental protocol and analysis as directed by their course leader.

Electronic Resources

Learners are encouraged to consult relevant websites on maths, statistics, experimental protocol and analysis.

Indicative Topics

- Statistics
- Experimental Protocol
- Data Analysis

Version History

Title: NCHNAP491 Maths, Statistics, Experimental Protocol and Analysis Course Descriptor **Approved by: Academic Board** **Location: Academic Handbook/Programme specifications and Handbooks/ Undergraduate Apprenticeship Programmes/BSc (Hons) Bioscience with Digital Technologies Programme Specification/Course Descriptors**					
Version number	**Date approved**	**Date published**	**Owner**	**Proposed next review date**	**Modification (As per AQF4) & category number**
3.0	October 2022	January 2023	Scott Wildman	September 2026	Category 1: Corrections/clarifications to documents which do not change approved content. Category 3: Changes to Learning Outcomes
2.1	May 2022	May 2022	Scott Wildman	September 2026	Category 1: Corrections/clarifications to documents which do not change approved content.
2.0	January 2022	April 2022	Scott Wildman	September 2026	Category 3: Changes to Learning Outcomes
1.0	September 2021	September 2021	Scott Wildman	September 2026	