Module Title:	Advanced Data Analysis and Modelling
Language of Instruction:	English

Credits:	5

NFQ Level:	8

Module Delivered In	1 programme(s)

Module Aim:	To introduce the students to a wide variety of Data-Analysis, Statistical and Modelling Techniques. (The emphasis will be on description and usefulness of the techniques studied rather than with routine calculations). To analyse a number of practical problems using computer facilities. Understanding issues to consider when designing a trial. Understanding the key statistical components involved in the planning and conduct of clinical trials.

Learning Outcomes	
On successful completion of this module the learner should be able to:	
LO1	Describe the key elements for the importance of good experimental design and apply the appropriate data-analytic techniques.
LO2	Describe and discuss key issues to consider when designing a clinical trial and the key statistical components involved in the planning and conduct of clinical trials.
LO3	Apply and recognise practical situations where a statistical or a deterministic model is appropriate.

Pre-requisite learning
Module Recommendations *This is prior learning (or a practical skill) that is recommended before enrolment in this module.*
No recommendations listed
Incompatible Modules *These are modules which have learning outcomes that are too similar to the learning outcomes of this module.*
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.*
No requirements listed

Module Content & Assessment

Indicative Content

Data managment
Priciples of good data managment. Key elements of a good graph and data visualisation. Review of types of data, confidence intervals and P values. Understanding and interpreting treatment effects, statistical significance, effect size, The principle of parsimony.

Statistical tests
Parametric vs nonparametric tests. Review of key statistical tests: Tests for differences in means. Student's T-Test, Analysis-of-Variance (ANOVA). Correlations and Significance of regression. Linear, Polynomial and Multiple Regression.

Experimental Design
Fundamental Principles of Good Design. Awareness of different types of outcomes and be able to select the appropriate statistical technique for the type of outcome and study design.

Biostatistics
Bioassays, bioavailability and bioequivalence. Prevalence and incidence. Study designs: cross-sectional, cohort, case-control, experimental, randomised control trials. Efficacy, dose response relationship, placebos. Understanding different types of trial designs and be able to choose the relevant design for a given question.

Clinical Trials
The role of the statistics in drug development. Understanding the key statistical components involved in the planning and conduct of clinical trials. Design configurations and issues, Parallel Group Design, Crossover Design, Factorial Designs. Design Techniques to Avoid Bias, Blinding, Randomization. Control groups, confounding factors. Statistical versus clinical significance. Study protocol.

Deterministic models and pharmacokinetics
The application of differential equations including pharmacokinetics such as variation of drug and metabolic levels in various fluids and tissues of the body, compartment models for mixtures, rates of drug absorption and elimination, elimination half-life and dose determination for anesthetic drugs.

Assessment Breakdown	%
Continuous Assessment	30.00%
Practical	30.00%
End of Module Formal Examination	40.00%

Special Regulation

Students must achieve a minimum grade (35%) in both the practical/CA and final examination.

Continuous Assessment

Assessment Type	Assessment Description	Outcome addressed	% of total	Assessment Date
Practical/Skills Evaluation	Typically may include assignments, quizzes, analysis of data sets or examination.	1,2,3	30.00	n/a

No Project

Practical

Assessment Type	Assessment Description	Outcome addressed	% of total	Assessment Date
Practical/Skills Evaluation	Practical exam and assignments	1,2,3	30.00	n/a

End of Module Formal Examination

Assessment Type	Assessment Description	Outcome addressed	% of total	Assessment Date
Formal Exam	Exam questions	1,2,3	40.00	End-of-Semester

SETU Carlow Campus reserves the right to alter the nature and timings of assessment

Module Workload

Workload: Full Time

Workload Type	Frequency	Average Weekly Learner Workload
Lecture	12 Weeks per Stage	2.00
Practicals	12 Weeks per Stage	2.00
Independent Learning Time	15 Weeks per Stage	5.13
	Total Hours	125.00

Module Delivered In

Programme Code	Programme	Semester	Delivery
CW_SAPHA_B	Bachelor of Science (Honours) in Pharmaceutics and Drug Formulation	8	Mandatory