Module Title:	Quantitative Methods and Quality Control 2
Language of Instruction:	English

Credits:	5

NFQ Level:	6

Module Delivered In	6 programme(s)

Teaching & Learning Strategies:	This module will be delivered via four lecture hours and one computer practical per week. Self-tests and tutorial sheets will be available through Blackboard to reinforce learning.

Module Aim:	This module will develop the learner's ability to analyse and understand data through the use of inferential statistics and to develop the students' understanding of the quality control techniques used in industry.

Learning Outcomes	
On successful completion of this module the learner should be able to:	
LO1	Apply inferential statistics to conduct a variety of hypothesis tests on population parameters and explore the relationship between variables.
LO2	Formulate, solve and interpret scientific problems using differential and integral calculus.
LO3	Use and interpret statistical process control techniques.

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
Introduction to Hypothesis Testing Introduction to inferential statistics. The Elements of a Test of Hypothesis. Formulating the null and alternative hypotheses. Setting Up the Rejection Region.
One sample problems for the population mean Identifying and Estimating the Target Parameter. Confidence Interval for a Population Mean. Students t distribution. Test of Hypothesis about a Population Mean.
Measures and Tests of Association Scatter diagrams. Pearson and Spearman correlation coefficients, correlation and causation. Independent and dependent variables. Simple Linear regression. The regression equation and prediction, the method of least squares.
Tests of association Categorical Data and the Multinomial Experiment. Chi-squared test of association. Testing Categorical Probabilities: One-Way Table. Testing Categorical Probabilities: Two-Way (Contingency) Table
Tests for the population variance Test of Hypothesis about a Population Variance. F test for equality of variances
Calculus Review of basic calculus. Solve scientific problems using differential and integral calculus. Model scientific situations using elementary differential equations.
Sampling Acceptance Sampling, Operating Characteristic (OC) curve. Acceptable Quality Level (AQL), Lot Tolerance Percent Defective (LTPD or RQL), producer's risk and consumer's risk. Average Outgoing Quality (AOQ) and Average Outgoing Quality Limit (AOQL).
Control Charts Principles of Statistical Process Control (SPC). Control Charts for Variables: average and range charts, pre-control chart, cumulative sum control chart (CUSUM) and multi-vari charts. Control charts for Attributes: np, p, u and c charts. Interpretation and design of charts. Process Capability Analysis.
Reliability Reliability calculations, failure rate, mean time to failure (MTTF), life-tests, design for reliability.

Assessment Breakdown	%
Continuous Assessment	70.00%
Practical	30.00%

Special Regulation
Students must achieve a minimum grade (35%) in both the CA and practical components of the course.

Continuous Assessment				
Assessment Type	*Assessment Description*	*Outcome addressed*	*% of total*	*Assessment Date*
Examination	Quantitative Methods and Quality Control examinations and assessments	1,2	70.00	n/a

No Project

Practical				
Assessment Type	*Assessment Description*	*Outcome addressed*	*% of total*	*Assessment Date*
Practical/Skills Evaluation	Computer practicals and assessments.	2,3	30.00	n/a

No End of Module Formal Examination

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	4.00
Practicals	12 Weeks per Stage	1.00
Estimated Learner Hours	15 Weeks per Stage	4.33
	Total Hours	125.00

Module Delivered In

Programme Code	Programme	Semester	Delivery
CW_SABTP_B	[Bachelor of Science (Honours) in Biosciences with Biopharmaceuticals](#)	4	Mandatory
CW_SABRE_B	[Bachelor of Science (Honours) in Brewing and Distilling](#)	4	Mandatory
CW_SAPHA_B	[Bachelor of Science (Honours) in Pharmaceutics and Drug Formulation](#)	4	Mandatory
CW_SAASC_D	[Bachelor of Science in Analytical Science](#)	4	Mandatory
CW_SABFQ_D	[Bachelor of Science in Biosciences](#)	4	Mandatory
CW_SASCI_C	[Higher Certificate in Science in Applied Biology or Applied Chemistry](#)	4	Mandatory

Programme Code	Programme	Semester	Delivery