

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	
<i>On successful completion of this module the learner should be able to:</i>	
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 <i>This is prior learning (or a practical skill) that is recommended before enrolment in this module.</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.</i>	
No incompatible modules listed	
Co-requisite Modules	
No Co-requisite modules listed	
Requirements <i>This is prior learning (or a practical skill) that is mandatory before enrolment in this module is allowed.</i>	
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		
<i>Workload Type</i>	<i>Frequency</i>	<i>Average Weekly Learner Workload</i>
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