Module Title:	Quality Management, Experimental Design and Data Analysis
Language of Instruction:	English

Credits:	10

NFQ Level:	7

Module Delivered In	1 programme(s)

Teaching & Learning Strategies:	This module will be taught in two theory classes and two computer practical classes per week. It will be delivered using a blended learning approach. Lectures will be given to provide a structured framework for the learning outcomes and to explain concepts. Students will work in supervised and unsupervised groups. To develop a structured approach to problem solving. Access to on-line resources will be encouraged and facilitated in the computing classes. Practical sessions in Excel and SPSS will run during the schedule.

Module Aim:	The aim of this module is to give students an overview of quality management systems and develop their understanding of statistical concepts and techniques as used in science and industry.

Learning Outcomes
On successful completion of this module the learner should be able to:

LO1	Describe the process model of quality, different quality management systems, standardisation, accreditation and continuous quality improvement methodologies.
LO2	Apply statistical tools to explore the relationship between variables and be able to interpret statistical information to be able to analyse data for problem solving.
LO3	Analyse a wide range of data from experiments. using laboratory practicals to demonstrate problem solving techniques and team working to analyse and interpret data. Both statistical and quality analysis tools will be developed.
LO4	Develop the ability to design experiments and analyse experimental data.

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.*
Successful completion of year 2 or equivalent

Module Content & Assessment

Indicative Content

Quality Management: Continuous Quality Improvement
Definitions of quality, quality control, quality assurance and quality management. Principles of a quality system, TQM and quality philosophies. Process model of quality and Quality by Design. Quality costs, consumer protection and product safety. Problem solving techniques for process improvement. Lean Six Sigma Methodology.

Quality Management: Certification, Standardisation and Accrediation
Definitions of standards and standardisation. Rationale, development and structure of standards. Standards and Regulations. Accreditation and certification. National and international bodies and schemes including NSAI, INAB, ISO, BRC and EIQA, method validation and PT schemes. Standards supporting innovation.

Quality Management: Quality Management Systems
ISO 9000 family. ISO 9001 and the seven quality management principles. Alignment of ISO 9001 with other standards, e.g. ISO 14001; Environmental Mgt Systems, ISO 22000; Food Safety Mgt Systems and ISO17025; General Requirements for the Competence of Calibration and Testing Laboratories.

Quality Management: Management
Levels of management, roles and responsibilities. Quality meetings, team building, team working, motivation, leadership and managing change. Project planning, setting objectives and meeting milestones. Producing deliverables and project evaluation.

Quality Management: Auditing
Internal and external auditing. Role of an auditor and the auditing team. Designing, planning and implementing an audit. Audit tools and checklists. Audit close out and management review.

Statistics and Experimental Design: Probability Essentials
Hypergeometric, binomial, negative binomial, Poisson, Gauss Normal, uniform probability distributions. Conditional probability and Bayes Theorem.

Statistics and Experimental Design: Central Limit Theorem:
One sample problems, confidence interval for the mean, one-sample Student's t test.

Statistics and Experimental Design:Two sample Problems
Student's t test for paired and unpaired situations.

Statistics and Experimental Design: Continuous probability distributions
Student's t, Chi-squared and F probability distributions.

Statistics and Experimental Design: Many sample problems
The analysis of variance (ANOVA) technique. Single factor ANOVA, two-factor ANOVA with and without replication

Statistics and Experimental Design: Principles of experimental design
Randomisation, replication and controls, use of random numbers in treatment allocation. Completely randomised design, blocking and randomised block design, Latin square designs, introduction to factorial experimental designs.

Assessment Breakdown	%
Continuous Assessment	10.00%
Practical	50.00%
End of Module Formal Examination	40.00%

Continuous Assessment

Assessment Type	Assessment Description	Outcome addressed	% of total	Assessment Date
Examination	Quality management and experimental design CA exams and data analysis.	1,3,4	10.00	n/a

No Project

Practical

Assessment Type	Assessment Description	Outcome addressed	% of total	Assessment Date
Practical/Skills Evaluation	Computer practicals and assessments.	1,2,3,4	50.00	n/a

End of Module Formal Examination

Assessment Type	Assessment Description	Outcome addressed	% of total	Assessment Date
Formal Exam	Three hour written examination.	1,2,3,4	40.00	End-of-Semester

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

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Module Workload

Workload: Full Time		
Workload Type	*Frequency*	*Average Weekly Learner Workload*
Lecture	30 Weeks per Stage	2.00
Practicals	30 Weeks per Stage	2.00
Estimated Learner Hours	30 Weeks per Stage	3.00
	Total Hours	210.00

Module Delivered In

Programme Code	Programme	Semester	Delivery
CW_SABFQ_D	Bachelor of Science in Biosciences	5	Mandatory