Module Descriptor

Title	Statistical Quality Control		
Session	2025/26	**Status**	Published
Code	QUAL11002	**SCQF Level**	11
Credit Points	20	**ECTS (European Credit Transfer Scheme)**	10
School	**Computing, Engineering and Physical Sciences**		
Module Co-ordinator	F Anvari		

Summary of Module

A review of data handling (types of data, variation, randomness, sampling, frequency distributions, histograms, time series, summary statistics, etc.) is intended to bring all students up to an acceptable level of interaction with data analysis.

Concept of probability: Probability rules. Probability distributions - hypergeometric, binomial, geometric, Poisson, exponential, normal. Probability plots. Confidence intervals. Concept of expectation. Central limit theorem.

Acceptance sampling: Single sampling plans: Acceptable Quality Level, Producer's Risk, Limiting Quality, Consumer's Risk, Operating Characteristic, Rectifying Inspection, Average Outgoing Quality, Average Outgoing Quality Limit, Average Total Inspection. Double sampling plans: Operating Characteristic, Average Sample Number.

Control charts: X bar and range charts for variables, p charts and c charts for attributes, and discussion of diffferent control charts. Decision rules are introduced and examined. Opportunities are given to decide, use, and select a suitable type of chart, and to construct and use the chart.

Voice of Customer: Capability indices (Cp index and Cpk index): their calculation, interpretation, and limitations.

Design of experiments and hypothesis testing: different tests such as t tests and chi squared tests.

Metrology: the importance of measurement, relationship between standards and measurement in a quality process, identification of quality characteristics of a product or service, effect of instrument characteristics on measurement results and GR&R studies.

Lean Six Sigma: 7+1 wastes, DMAIC methodology and tools and techniques to deploy Lean Six Sigma.

During the course of this module students will develop their UWS Graduate Attributes (https://www.uws.ac.uk/current- students/your-graduate-attributes/) in the following areas-

Universal: Academic - Critical thinking, analytical & inquiring mind; Personal- Ethical; Professional- Research Minded

Work-Ready: Academic - Knowledgeable, Digitally Literate, Problem Solver; Personal - Effective Communicator; Professional - Ambitious

Successful : Academic - Autonomous; Personal - Resilient; Professional- Driven

This module has been reviewed and updated, taking cognisance of the University's Curriculum Framework principles. Examples of this are found within the module such as active and engaging tutorial activity with contemporary industry examples of modular content, module assessment which reflects industry activities, learning synergies across modules and levels of study and recorded lecture content supporting students to organise their own study time.

Module Delivery Method	**On-Campus**[1] ☒	**Hybrid**[2] ☐	**Online**[3] ☒	**Work -Based Learning**[4] ☐
Campuses for Module Delivery	☐ Ayr ☐ Dumfries	☐ Lanarkshire ☐ London ☒ Paisley	☒ Online / Distance Learning ☐ Other (specify)	

Terms for Module Delivery	Term 1	☒	Term 2	☐	Term 3	☐
Long-thin Delivery over more than one Term	Term 1 – Term 2	☐	Term 2 – Term 3	☐	Term 3 – Term 1	☐

Learning Outcomes	
L1	Select, describe and critically use the main concepts and practices of statistics as the science of collecting, analyzing and presenting data.
L2	Create and implement suitable acceptance sampling schemes for the given guarantees and evaluate the benefits gained from Single and Double sampling.
L3	Select and employ the common tools found in statistical quality control and demonstrate a critical awareness in their use and limitations.
L4	Examine, discuss and debate the importance of metrology and standards in quality issues.
L5	Select and justify strategies for quality improvement and participate in the debate of benefits etc of chosen strategies.

Employability Skills and Personal Development Planning (PDP) Skills	
SCQF Headings	**During completion of this module, there will be an opportunity to achieve core skills in:**

[1] Where contact hours are synchronous/ live and take place fully on campus. Campus-based learning is focused on providing an interactive learning experience supported by a range of digitally-enabled asynchronous learning opportunities including learning materials, resources, and opportunities provided via the virtual learning environment. On-campus contact hours will be clearly articulated to students.

[2] The module includes a combination of synchronous/ live on-campus and online learning events. These will be supported by a range of digitally-enabled asynchronous learning opportunities including learning materials, resources, and opportunities provided via the virtual learning environment. On-campus and online contact hours will be clearly articulated to students.

[3] Where all learning is solely delivered by web-based or internet-based technologies and the participants can engage in all learning activities through these means. All required contact hours will be clearly articulated to students.

[4] Learning activities where the main location for the learning experience is in the workplace. All required contact hours, whether online or on campus, will be clearly articulated to students

Knowledge and Understanding (K and U)	**SCQF 11** The theory underpinning acceptance sampling, control charts and process capability indices.
Practice: Applied Knowledge and Understanding	**SCQF 11** Application of acceptance sampling, control charts and assessment of process capability.
Generic Cognitive skills	**SCQF 11** Selection with explanation of appropriate tools in a given situation.
Communication, ICT and Numeracy Skills	**SCQF 11** Explanation, calculation, use of a software and presentation.
Autonomy, Accountability and Working with Others	**SCQF 11** Participation in class debates and team based learning and presenting.

Prerequisites	**Module Code**	**Module Title**
	Other	
Co-requisites	**Module Code**	**Module Title**

Learning and Teaching
In line with current learning and teaching principles, a 20-credit module includes 200 learning hours, normally including a minimum of 36 contact hours and maximum of 48 contact hours. The Learning & Teaching Strategy for this module is based on the general strategy for the MSc Quality Management. Classes are delivered on a weekly basis. Lectures will introduce and exemplify key theoretical and critical concepts. Tutorial sessions will be given to further develop students' understanding. Computer laboratory sessions will be used to develop data handling and analysis skills. Students will be given sufficient time and support to work on assignments. For On-line Learning students, full use will be made of the VLE. That is, all teaching material will be made available on-line and students will be guided through the material. Email and video-conferencing will be used extensively to support students. Group work will be organised and supported through facilities on the VLE such as forums and wikis. Group presentations will be made by video conference and scheduled according to time zones. Face-to-face students will use Microsoft Excel software/Minitab for data analysis. On-line students may choose to use an equivalent package if they wish. The module delivery framework strikes a balance between in-person events and synchronous online activities. The learning and teaching engagement for this module includes the following: • Lectures / Core Content Delivery: 18 hours • Tutorials / Synchronous Activities: 18 hours • Independent Study: 164 hours Formative feedback will be provided to support academic activities. This feedback may take various forms, such as question-and-answer sessions during lectures or core content delivery, worked examples, design exercises, and feedback on presentations. It may also involve discussion groups during tutorials. Additional opportunities for feedback include

submitting coursework to receive formative reports, comments on tutorial or practical work during sessions and responses to email queries.

Learning Activities During completion of this module, the learning activities undertaken to achieve the module learning outcomes are stated below:	**Student Learning Hours** (Note: Learning hours include both contact hours and hours spent on other learning activities)
Lecture / Core Content Delivery	18
Tutorial / Synchronous Support Activity	18
Independent Study	164
n/a	0
n/a	0
n/a	0
TOTAL	200

Indicative Resources

The following materials form essential underpinning for the module content and ultimately for the learning outcomes:

Kubiak, T.M. and Benbow, D.W. The certified Six Sigma black belt handbook. Milwaukee: ASQ Quality Press.

Munro, R.A., Ramu, G. and Zrymiak, D.J. (2015). The certified Six Sigma green belt handbook. Milwaukee:ASQ Quality Press.

Stapenhurst, T. (2013) Mastering statistical process control. London: Routledge.

Montgomery, D.C.(2009) Introduction to Statistical Quality Control. 6th edn. Oxford: John Wiley and Sons.

Martin J.W.(2006) Lean Six Sigma for Supply Chain Management, McGraw-Hill Professional

George M. L. (2003) Lean Six Sigma for Service: How to Use Lean Speed and Six Sigma to Improve Services and Transactions. Maidenhead: McGraw-Hill Professional.

Breyfogle, F.W. (2003) Implementing Six Sigma - Smarter Solutions using Statistical Methods, 2nd edn. Oxford: John Wiley and Sons.

(N.B. Although reading lists should include current publications, students are advised (particularly for material marked with an asterisk*) to wait until the start of session for confirmation of the most up-to-date material)

Attendance and Engagement Requirements

In line with the Student Attendance and Engagement Procedure, Students are academically engaged if they are regularly attending and participating in timetabled on-campus and online teaching sessions, asynchronous online learning activities, course-related learning resources, and complete assessments and submit these on time.

For the purposes of this module, academic engagement equates to the following:

The School of Computing, Engineering and Physical Sciences considers attendance and engagement to mean a commitment to attending, and engaging in, timetabled sessions.

Students will scan their attendance, via the attendance scanners, each time they are on-campus, they will have their attendance recorded in class and they will be expected to login to the VLE several times per week. Students who are unable to attend a timetabled session, due to illness or other circumstance, should notify their Programme Leader. Across the School an 80% attendance threshold is set. Students who fall below this, will be referred to the Student Success Team to see how they can be best supported in their studies.

Equality and Diversity
The University's Equality, Diversity and Human Rights Procedure can be accessed at the following link: UWS Equality, Diversity and Human Rights Code. Aligned with the University's commitment to equality and diversity, this module supports equality of opportunity for students from all backgrounds and learning needs. Using the VLE, material will be presented electronically in formats that allow flexible access and manipulation of content. This module complies with University regulations and guidance on inclusive learning and teaching practice. Specialist assistive equipment, support provision and adjustment to assessment practice in accordance with the University's policies and regulations.
(N.B. Every effort will be made by the University to accommodate any equality and diversity issues brought to the attention of the School)

Supplemental Information

Divisional Programme Board	**Engineering Physical Sciences**
Overall Assessment Results	☐ **Pass / Fail** ☒ **Graded**
Module Eligible for Compensation	☐ **Yes** ☒ **No** **If this module is eligible for compensation, there may be cases where compensation is not permitted due to programme accreditation requirements. Please check the associated programme specification for details.**
School Assessment Board	Civil Engineering and Quality Management
Moderator	E Viza
External Examiner	A Garad
Accreditation Details	N/A
Module Appears in CPD catalogue	☐ **Yes** ☒ **No**
Changes / Version Number	2.21 Module Descriptor copied to 2025/26 template and resources list updated to reflect ILR feedback. Attendance and Engagement and EDI statements updated.

Assessment (also refer to Assessment Outcomes Grids below)
Assessment 1
Individual Coursework, worth 25% of the module. Group Project, worth 15% of the module.
Assessment 2

One class test (Unseen, Open book), worth 60% of the module.
Assessment 3
N/A
(N.B. (i) Assessment Outcomes Grids for the module (one for each component) can be found below which clearly demonstrate how the learning outcomes of the module will be assessed. (ii) An indicative schedule listing approximate times within the academic calendar when assessment is likely to feature will be provided within the Student Module Handbook.)

Component 1							
Assessment Type	**LO1**	**LO2**	**LO3**	**LO4**	**LO5**	**Weighting of Assessment Element (%)**	**Timetabled Contact Hours**
Coursework	☒	☒	☒	☐	☒	40	

Component 2							
Assessment Type	**LO1**	**LO2**	**LO3**	**LO4**	**LO5**	**Weighting of Assessment Element (%)**	**Timetabled Contact Hours**
Class test	☒	☒	☒	☒	☒	60	2

Component 3							
Assessment Type	**LO1**	**LO2**	**LO3**	**LO4**	**LO5**	**Weighting of Assessment Element (%)**	**Timetabled Contact Hours**
N/A	☐	☐	☐	☐	☐		
Combined total for all components						100%	2 hours

Change Control

What	**When**	**Who**
Module Descriptor copied to 2025/26 template and resources list updated to reflect ILR feedback. Attendance and Engagement and EDI statements updated.	March 2025	F.Anvari