

CHEM08022 Statistics for Analytical Chemistry

Full Title	Statistics for Analytical Chemistry		
Status	Uploaded to Banner	Start Term	2020
NFQ Level	08	ECTS Credits	05
Module Code	CHEM08022	Duration	Semester - (13 Weeks)
Grading Mode	Numeric	Department	Physical & Life Sciences
Module Author	John Keary		

Module Description

This module will integrate the understanding of the results of the analytical methods explored throughout this programme with statistical analysis required to report meaningful and reliable results. The module will look at the mathematics underlying calibration, validation and hypothesis testing.

Learning Outcomes

On completion of this module the learner will/should be able to:

1. Identify the requirements for the results of an analysis to be statistically significant
2. Estimate and improve accuracy by determining bias and precision of a method
3. Apply statistical methods for hypothesis testing, analytical method validation and proficiency testing
4. Apply regression to determine calibration factors and their uncertainty
5. Prepare quality control charts

Indicative Syllabus

Introduction to main statistical methods used in modern analytical laboratories.

Explain the theory of the estimation of measurement uncertainty and the validation of analytical methods.

Understand how to test a hypothesis using various statistical tests

Describe how the accuracy of a method can be improved by measuring bias and precision

The use of Excel and Minitab for statistical processing of data and to report meaningful and reliable results.

Teaching and Learning Strategy

This module will be delivered as a combination of online lectures, tutorials and workshops. Moodle will be the primary learning technology for communication and accessing lecture material and learning resources.

An initial on-campus day will be used for introductions, sharing of experiences and team building.

The online learning environment will be adapted to encourage student interaction through the use of scaffolding and workflow creation with students able to engage with materials that allow for self-assessment. Topic sections will be identified and planned in advance. A varied mix of content will be developed and delivered. Content will be developed in bite size elements. Each week there will be an activity planned. Activities can include (but not exclusive) discussion forums, quizzes etc.. The activity instructions will be defined & posted in advance. The lecturer will actively participate and give timely feedback in an appropriate manner, monitor students' progress, read the online "body language" via participation, progression, lurking and respond appropriately. In addition, use of automated personalised feedback and progress reports will provide students with an oversight of their own development and promote learner engagement.

At the same time, the lecturer as facilitator and moderator will encourage and enable quality communication both offline and online. Ground rules for acceptable and expected communication will be outlined at the start of the module. The lecturer will lead by example, by initiating discussion, giving prompts/questions, participating. Online and offline discussion will be encouraged and enabled as part of the learning process.

Assessment Strategy

Continuous assessments (60%). Examples of assessment strategy include computer laboratory weekly assignments and onlinen quizzes.
Final exam (40%) - this will be a computer based open book exam,

Repeat Assessment Strategies

Repeat assessment will be accommodated in line with GMIT Code of Practice No. 3 Student Assessment: Marks & Standards procedures and in compliance with programme board decisions.

Students who fail the theoretical component will be required to retake the theoretical exam at a subsequent exam session.

Where a student has failed the continuous assessment component of the module the nature of assessment will be linked to the need to achieve particular learning outcomes. They may be in the form of a written assessment, written assignment or other relevant assessment.

Individuals may be interviewed or asked to present their work in a formal context to validate authenticity and ownership of work.

Indicative Coursework and Continuous Assessment:		60 %		
Form	Title	Percent	Week (Indicative)	Learning Outcomes
Assessment	weekly computer labs, completion of homework assignments, Moodle quizzes	60 %	OnGoing	1,2,3,4,5

End of Semester / Year Formal Exam:		40 %		
Form	Title	Percent	Week (Indicative)	Learning Outcomes
Practical Evaluation	Final practical computer exam	40 %	End of Term	1,2,4,5

Blended Delivery Mode Average Weekly Workload:			2.00 Hours		
Type	Description	Location	Hours	Frequency	Weekly Avg
Online Learning	Online Learning	Not Specified	2	Weekly	2.00

Required Reading Book List

Miller, J., (2017). *Statistics and Chemometrics for Analytical Chemistry*.
ISBN 1292186712 ISBN-13 9781292186719

Gooding, J., (2005). *Data Analysis for Chemistry*. OUP USA.
ISBN 0195162110 ISBN-13 9780195162110

Online Resources

<https://eurachem.org/>

<https://www.nsai.ie/>

<https://www.bsigroup.com/en-IE/>

<https://www.ich.org/>

Programme Membership

GA_SAACG_L08 202000 Higher Diploma in Science in Advanced Analytical Chemistry