



MOLS7252

Analytical Measurement Uncertainty and Method Validation

Session 1, Weekday attendance, North Ryde 2020

Department of Molecular Sciences

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General Information

Unit convenor and teaching staff

Danny Wong

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Credit points

10

Prerequisites

Admission to MRes

Corequisites

Co-badged status

MOLS8252

Unit description

Chemical measurements are required in forensic science, local and international trade, manufacture and production, government regulatory agencies, biotechnology, and nearly every field of science. However, there are always uncertainties associated with measurements owing to experimental errors. This unit systematically covers the estimation principles of measurement uncertainty of values deriving from analytical chemistry measurement procedures and a logical approach to the process of validating an analytical chemistry measurement method. These will then be applied to specific examples from common analytical chemistry.

Important Academic Dates

Information about important academic dates including deadlines for withdrawing from units are available at <https://www.mq.edu.au/study/calendar-of-dates>

Learning Outcomes

On successful completion of this unit, you will be able to:

ULO1: Interpret the concept of making valid analytical measurements

ULO2: Identify and then to evaluate analytical method performance characteristics

ULO3: Describe the requirements for valid measurements with respect to international standards

ULO4: Deconstruct an analytical method in order to identify factors that influence the final result

ULO5: Evaluate the validity of chemical data using commonly applied statistical

techniques

Assessment Tasks

Coronavirus (COVID-19) Update

Assessment details are no longer provided here as a result of changes due to the Coronavirus (COVID-19) pandemic.

Students should consult [iLearn](#) for revised unit information.

[Find out more about the Coronavirus \(COVID-19\) and potential impacts on staff and students](#)

Delivery and Resources

Coronavirus (COVID-19) Update

Any references to on-campus delivery below may no longer be relevant due to COVID-19.

Please check here for updated delivery information: https://ask.mq.edu.au/account/pub/display/unit_status

Technology Used

It is important that you have a scientific calculator as hand-held calculators will be used for assignments and in the final examination. Note that text retrieval calculators are not allowed in the final examination.

Use will be made of Excel and other data processing and display software. Computers carrying this software are available in the teaching laboratories. Items of interest, links to other on-line material will be placed on the unit website.

Prescribed text

J.N.Miller, J.C.Miller, R.D.Miller, *Statistics and Chemometrics for Analytical Chemistry*, 7th Edition, Pearson Prentice Hall, 2018 (ISBN: 978-1-292-18671-9)

Recommended references

D.C.Montgomery, *Design and Analysis of Experiments*, 6th Edition, John Wiley & Sons, 2005 (ISBN: 0 471 48735 X)

R.G.Brereton, *Applied Chemometrics for Scientists*, John Wiley & Sons, 2007 (ISBN: 978 0 470 01686 2)

J.Lawson, J.Erjavec, *Modern Statistics for Engineering and Quality Improvement*, Duxbury Thomson Learning, 2001 (ISBN: 0 534 19050 2)

Eurachem/CITAC Guide: Traceability in Chemical Measurement, Eurachem and CITAC, 2003

ISO/IEC International Standard 17025 General Requirements for the competence of testing and

calibration laboratories, ISO, 2005

In House Method Validation: A guide for Chemical Laboratories, LGC Ltd, 2003

Eurachem Guide: the Fitness for purpose of analytical methods, LGC Ltd, 1988

Eurachem/CITAC Guide CG4: Quantifying Uncertainty in Analytical Measurement 2nd Edition, Eurachem & CITAC, 2000

L.Kirkup, *Data Analysis with Excel: An introduction for physical scientists*, Cambridge University Press, 2002

D.B.Hibbert, *Quality Assurance for the Analytical Chemistry Laboratory*, Oxford University Press, 2007

Useful websites

Eurachem -<http://www.eurachem.org/>

NIST/SEMATECH Engineering Statistics Handbook <http://www.itl.nist.gov/div898/handbook/index.htm>

Valid Analytical Measurements <http://www.vam.org.uk/home.asp>

CITAC - <http://www.citac.cc/>

AOAC - <http://www.aoac.org/>

NATA - <http://www.nata.com.au/publication-updates> and download “Technical Note 17”.

Policies and Procedures

Macquarie University policies and procedures are accessible from [Policy Central \(https://staff.mq.edu.au/work/strategy-planning-and-governance/university-policies-and-procedures/policy-central\)](https://staff.mq.edu.au/work/strategy-planning-and-governance/university-policies-and-procedures/policy-central). Students should be aware of the following policies in particular with regard to Learning and Teaching:

- [Academic Appeals Policy](#)
- [Academic Integrity Policy](#)
- [Academic Progression Policy](#)
- [Assessment Policy](#)
- [Fitness to Practice Procedure](#)
- [Grade Appeal Policy](#)
- [Complaint Management Procedure for Students and Members of the Public](#)
- [Special Consideration Policy](#) (**Note:** *The Special Consideration Policy is effective from 4 December 2017 and replaces the Disruption to Studies Policy.*)

Students seeking more policy resources can visit the [Student Policy Gateway \(https://students.mq.edu.au/support/study/student-policy-gateway\)](https://students.mq.edu.au/support/study/student-policy-gateway). It is your one-stop-shop for the key policies you need to know about throughout your undergraduate student journey.

If you would like to see all the policies relevant to Learning and Teaching visit [Policy Central \(http://staff.mq.edu.au/work/strategy-planning-and-governance/university-policies-and-procedures/policy-central\)](http://staff.mq.edu.au/work/strategy-planning-and-governance/university-policies-and-procedures/policy-central).

Student Code of Conduct

Macquarie University students have a responsibility to be familiar with the Student Code of Conduct: <https://students.mq.edu.au/study/getting-started/student-conduct>

Results

Results published on platform other than [eStudent](#), (eg. iLearn, Coursera etc.) or released directly by your Unit Convenor, are not confirmed as they are subject to final approval by the University. Once approved, final results will be sent to your student email address and will be made available in [eStudent](#). For more information visit ask.mq.edu.au or if you are a Global MBA student contact globalmba.support@mq.edu.au

Student Support

Macquarie University provides a range of support services for students. For details, visit <http://students.mq.edu.au/support/>

Learning Skills

Learning Skills (mq.edu.au/learningskills) provides academic writing resources and study strategies to help you improve your marks and take control of your study.

- [Getting help with your assignment](#)
- [Workshops](#)
- [StudyWise](#)
- [Academic Integrity Module](#)

The Library provides online and face to face support to help you find and use relevant information resources.

- [Subject and Research Guides](#)
- [Ask a Librarian](#)

Student Services and Support

Students with a disability are encouraged to contact the [Disability Service](#) who can provide appropriate help with any issues that arise during their studies.

Student Enquiries

For all student enquiries, visit Student Connect at ask.mq.edu.au

If you are a Global MBA student contact globalmba.support@mq.edu.au

IT Help

For help with University computer systems and technology, visit http://www.mq.edu.au/about_us/

[offices_and_units/information_technology/help/](#).

When using the University's IT, you must adhere to the [Acceptable Use of IT Resources Policy](#). The policy applies to all who connect to the MQ network including students.