

Module Title: Introduction to Chemical Metrology
Module Code: QM0301
Maximum Number of Students: 20
Total ECTS Credits 2
Notional Learning Hours (a) Contact Time - 10 h (b) Private Study - 40 h Format of Teaching: Lectures 8 h Laboratories or Practicals 2 h Other 0 h Teaching Strategy: Class lectures in 60 minute units
Convener: Dr George Peplow
University / Department: University of Malta / Department of Chemistry
Language of Tuition: English
Module Description - The Purpose or Aims: To introduce the general concept of metrology, and apply it to chemical analytical measurements.
Specific Learning Outcomes for this module: (contributing to general learning outcomes GLO 1 – GLO 10) At the end of the module, the learner should be able to: SLO 1. Understand the basis of metrology. SLO 2. Identify the measuring tools for chemical metrology. SLO 3. Establish procedures for reliable chemical measurements. SLO 4. Extend his knowledge by attending follow up topics.

Summary of Course Content:

The module starts with the basic definitions and explanation of basic metrological units. The difficulties of applying conventional measuring tools to chemistry. These tools are based on comparisons to established standards: traceability, with the quantification of uncertainties in their measurements. The methods adopted must also be validated according to standard procedures. The topics shall attempt to answer the following objectives:

- Any standard guidelines?
- Which measurement procedure?
- Calibrations?
- Correct use of mathematical tools Statistics.
- Look beyond the confines of the lab: Interlaboratory comparisons.
Use certified reference materials
- In-house reference materials
- Quality control
- International Institutions, Organisations.
- Vocabulary of International terms in Metrology.

Transferable Skills Taught:

Ability to relate physical metrology to chemical metrology
Knowledge to assess and evaluate a proper analytical procedure
Identify sources of information from international institutions.

Assessment Methods:

Written examination 70%.
Open book assignment 30%.

Assessment Criteria:

Details of assessment methods should include forms of assessment and the contribution of each to the summative assessment of the module. The relationship to the learning outcomes of the module should be explicit and the numbers of the various learning outcomes should be attached to the assessment methods listed. Please list in numerical order.

Threshold:

Elements of physical metrology, applications to basic chemical measurements.
Basic knowledge of comparisons and selection of methods and tools.

Good:

Correct explanation of measurement terms.
Understanding the use of standards in chemical measurements.
Distinguish between correct and incorrect calibrations and comparability.

Excellent:

Ideal understanding of the various metrology definitions to chemical measurements.
Skilled to evaluate a proper approach for validating a method.
Assess the traceability chain and identify weak links and the different measurement uncertainty issues.

Resource Implications of Proposal and Proposed Solutions:

Lecture handouts.

Texts:

Garfield F.M., Klesta E., Hirsch J., Quality Assurance Principles for Analytical Laboratories. 3rd Edn., AOAC 2000
Wenclawiak B.W., Koch M., ed., Quality Assurance in Analytical Chemistry. Springer 2003.

Pre-Requisites:

None.