

Module Details	
Module Title	Solid Analysis
Module Code	CFS7026-B
Academic Year	2023/4
Credits	20
School	School of Chemistry and Biosciences
FHEQ Level	FHEQ Level 7

Contact Hours	
Type	Hours
Lectures	18
Practical Classes or Workshops	18
Directed Study	164

Availability	
Occurrence	Location / Period
BDA	University of Bradford / Semester 1

Module Aims
<p>This module will provide you with specialist knowledge in the principles and application of XRD and thermal analysis. This covers: sample preparation, instrumental fundamentals and design, including case studies related to applications in specialist areas and recent advances. The specialist knowledge is reinforced by the 'hands on' practical component and will include use of the analytical centre instruments, collecting and analysing data, troubleshooting and method development/enhancement. The practical sessions will also involve following written experimental protocols, working in a small group, and working to deadlines.</p>

Outline Syllabus

X-Ray Diffraction: Module introduction. X-Ray Health and Safety. X-Ray crystallography: powder and single crystal, techniques in data collection; revision of basic crystallography and symmetry; systematic absences and space group determination; structure factors; the phase problem; direct methods for structure solution; techniques in refinement; disorder; molecular symmetry; analysis of molecular dimensions; crystal packing and non-bonded interactions. X-Ray and electron diffraction techniques, reciprocal lattice, crystal chemistry, crystal structure-property relationships. Phase identification with databases; X-Ray fluorimetry. Thermal Analysis: Module introduction. Thermal methods: overview of techniques: TGA, DTA/DSC, DVS and DMA (and other thermal methods in use). Principles and detailed theory for TGA and DSC including instrumentation, experimental considerations/method development (eg heating rates and their effect on data), calibration and sample preparation. Advanced thermal techniques: (1) Modulated Temperature DSC (MTDSC) and (2) Simultaneous thermal analysis and hyphenation of additional analytical probes (i) STA, (ii) TGA-Evolved Gas Analysis (mass spectrometry and FTIR) (iii) DSC-FTIR, DSC-Raman, DSC-XRD (iv) Hot-stage microscopy. Applications of thermal analysis exemplifying all of the above in areas of pharmaceutical and materials analysis.

Learning Outcomes

Outcome Number	Description
01	Evaluate and apply knowledge and understanding of the theories of instrumental analysis, including sample preparation and analysis.
02	Describe recent advances in the subject area.
03	Manipulate samples for selection, preparation and analysis.
04	Analyse, interpret and critically review experimental data generated with the selected techniques.
05	Identify poor quality analytical results and suggest/apply remedial action.
06	Apply skills in problem solving and written communication.

Learning, Teaching and Assessment Strategy

The assessment will be used to assess your learning and to enable you to demonstrate your problem-solving and interpretation skills.

Mode of Assessment

Type	Method	Description	Weighting
Summative	Laboratory Report	Student will submit a laboratory report detailing analysis of sample(s) and interpretation of experimental data.	50%
Summative	Examination - Closed Book	A formal exam covering the taught syllabus. Short questions followed by longer essay type questions. (2 Hrs)	50%

Reading List

To access the reading list for this module, please visit <https://bradford.rl.talis.com/index.html>

Please note:

This module descriptor has been published in advance of the academic year to which it applies. Every effort has been made to ensure that the information is accurate at the time of publication, but minor changes may occur given the interval between publishing and commencement of teaching. Upon commencement of the module, students will receive a handbook with further detail about the module and any changes will be discussed and/or communicated at this point.

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