UNIVERSITY of BRADFORD

Module Descriptor

Module Details	
Module Title	Materials Characterisation
Module Code	CFS7018-B
Academic Year	2020/1
Credits	20
School	School of Chemistry and Biosciences
Subject Area	Chemistry
FHEQ Level	FHEQ Level 7
Pre-requisites	N/A
Co-requisites	N/A

Contact Hours	
Type	Hours
Learning Objects Interaction	15
Online Tutorials (Synchronous)	3
Directed Study	164
Laboratories	3
Practical Classes or Workshops	15 (online workshop)

Availability	
Occurrence	Location / Period
BDA	University of Bradford / Semester 2

Module Aims

To introduce you to the methods of use in modern analysis of macromolecules & non-polymeric materials. To study both the theory behind the full range of techniques as well as basic interpretation of the data. The course aims to provide a general understanding of techniques & will prepare you for advanced research or development of polymer systems in industry. Many chemists work in the analytical sciences in industry or government laboratories (e.g. in forensics, pathology or health & safety labs) & the characterisation of polymers and non-polymeric materials plays a crucial role for many of these areas.

Outline Syllabus
1.Polymer distributions 2. Polymers in solution 3. Polymer solution viscometry 4. Light scattering of polymer solutions 5. Colligative properties and osmometry 6. Polymer NMR techniques and data interpretation 5. Mass spectrometry-theory and instrumentation 7. Size exclusion chromatography 8. Other chromatographic techniques 9. Scattering and diffraction techniques 10. Calorimetry 11. Mechanical analysis techniques 12. Thermal analysis techniques 13. Mass spectrometry of materials 14. Optical and electron microscopy techniques 15. Surface science/analysis techniques.

Learning Outcomes	
Outcome Number	Description
01	Analyse molar mass distributions
10	Evaluate how light, x-ray and neutron scattering can be used to study materials in the solid state and in dispersion
11	Evaluate how calorimetric and mechanical techniques can be used to study polymers in the solid state.
12	Evaluate the use of mass spectrometry for the analysis of materials.
13	Converse using the language of the polymer science
14	Use specialist software packages and spreadsheets to analyse data
15	Be competent at self-study and be able to quickly assimilate information
16	Be able to think across your own discipline and explore other fields
02	Explore how chemical composition and shape are dispersed and how these factors can be overlayed with distributions in molar mass
03	Evaluate solution behaviour of polymers
04	Critically examine how molar mass and shape affect solution viscosity
05	Critically examine how molar mass and shape affect light scattering behaviour in solution
06	Critically examine how molar mass affects colligative properties
07	Evaluate how NMR spectroscopy can be used to characterise materials
08	Critically evaluate the theory and application of size exclusion chromatography in the analysis of polymers
09	Evaluate the other chromatographic techniques for polymer analysis

Learning, Teaching and Assessment Strategy

The module uses a blended approach to support learning and achievement. Students will engage with a series of weekly online learning packages. These will include short videos that address key concepts, a set of structured activities (reading, online discussions etc.) that 'scaffold' the learning, and a range of formative tasks that generate feedback on progress. Online and on-campus practical sessions and workshops will provide opportunity to apply knowledge and gain experience with techniques. Online tutorials will also be used to support learning and monitor progress as students move through the curriculum.

At the start of this module we will look at distributions and dispersity in polymers: including dispersity in molar mass composition and shape. We will then build on your earlier studies on the solution behaviour of polymers, which forms the basis of many of the characterisation techniques that are in use.

We then move on to study the various techniques for providing molar mass, shape and chemical composition, as well as various microscopy techniques and surface science/analysis tools.

Directed study provides you with the opportunity to undertake guided reading and to develop your own portfolio of learning to enhance transferable skills and knowledge relating to the evaluation of your own role and subject provision.
Assessments will involve a summative online open book examination and a number of assessed workshops involving discussions and problem-solving exercises.

Assessment 1: Problem solving workshops based on lecture material.

Assessment 2: Summative examination in May to cover the whole module.

Mode of Assessment

Type	Method	Description	Length	Weighting
Summative	Coursework	Online problem based workshop (2000 words)	N/A	40%
Summative	Examination - Open Book	Summative assessment: open book exam	2 hour	60%

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.
