

Module Details	
Module Title:	Materials Characterisation
Module Code:	CFS7018-B
Academic Year:	2019-20
Credit Rating:	20
School:	School of Chemistry and Biosciences
Subject Area:	Chemistry
FHEQ Level:	FHEQ Level 7 (Masters)
Pre-requisites:	
Co-requisites:	

Contact Hours	
Type	Hours
Lectures	30
Tutorials	6
Directed Study	164

Availability	
Occurrence	Location / Period
BDA	University of Bradford / Semester 2 (Feb - May)

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

1	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
2	Explore how chemical composition and shape are dispersed and how these factors can be overlayed with distributions in molar mass
3	Evaluate solution behaviour of polymers
4	Critically examine how molar mass and shape affect solution viscosity
5	Critically examine how molar mass and shape affect light scattering behaviour in solution
6	Critically examine how molar mass affects colligative properties
7	Evaluate how NMR spectroscopy can be used to characterise materials
8	Critically evaluate the theory and application of size exclusion chromatography in the analysis of polymers
9	Evaluate the other chromatographic techniques for polymer analysis

Learning, Teaching and Assessment Strategy

Lectures will deliver core content; providing you with the opportunity to acquire the information to enhance your knowledge and understanding of the basic undergraduate aspects of the

molecular basis of life. This will be complemented by seminars, group discussions and tutorials to allow you to apply this learning to specific exemplar problems.

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 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	Examination - closed book	Summative assessment: closed book exam	2 hours	60%
Summative	Coursework	Problem based workshop	-2000 words	40%

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.