

Materials Characterisation

Module Code:	CFS7018-B
Academic Year:	2018-19
Credit Rating:	20
School:	School of Chemistry and Biosciences
Subject Area:	Chemistry and Forensic Science (ceases 2016)
FHEQ Level:	FHEQ Level 7 (Masters)

Pre-requisites:

Co-requisites:

Contact Hours

Type	Hours
Lectures	30
Tutorials	6
Directed Study	164

Availability Periods

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.

Module Learning Outcomes

On successful completion of this module, students will be able to...

- 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

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	Final Assess'
Summative	Examination - closed book	Summative assessment: closed book exam	2 hours	60%	Yes
Summative	Coursework	Problem based workshop	-2000 words	40%	No

Legacy Code (if applicable)

CT-4023D

Reading List

To view Reading List, please go to [rebus:list](#).