

| Module Details        |                                    |
|-----------------------|------------------------------------|
| <b>Module Title</b>   | Polymer and Materials Engineering  |
| <b>Module Code</b>    | CPE7012-B                          |
| <b>Academic Year</b>  | 2022/3                             |
| <b>Credit Rating</b>  | 20                                 |
| <b>School</b>         | Department of Chemical Engineering |
| <b>Subject Area</b>   | Chemical and Process Engineering   |
| <b>FHEQ Level</b>     | FHEQ Level 7                       |
| <b>Pre-requisites</b> |                                    |
| <b>Co-requisites</b>  |                                    |

| Contact Hours                  |       |
|--------------------------------|-------|
| Type                           | Hours |
| Lectures                       | 22    |
| Practical Classes or Workshops | 10    |
| Tutorials                      | 8     |
| Directed Study                 | 160   |

| Availability |                   |
|--------------|-------------------|
| Occurrence   | Location / Period |

|     |                                     |
|-----|-------------------------------------|
| BDA | University of Bradford / Semester 2 |
|-----|-------------------------------------|

### Module Aims

To provide understanding on the structure and mechanical behaviour of polymers and other materials and to enable students to gain experience of manipulating polymer structure and characterising polymer properties.

### Outline Syllabus

Polymer structure, morphology and polymerisation. Mechanical and viscoelastic properties, consideration in design. Thermal characterisation; DSC, DMA, spectroscopy. Polymer melt processing; melt rheology, injection moulding, extrusion forming, reactive extrusion (REX); design of process equipment such as screws, dies and moulds. Leading edge technologies: Polymer composites and nanocomposites, biomedical and pharmaceutical polymer applications, solid state processing, micro and nano fabrication methods.

### Learning Outcomes

|    |                                                                                                                  |
|----|------------------------------------------------------------------------------------------------------------------|
| 01 | Demonstrate knowledge on effect of processing parameters of several on microstructure and morphology development |
| 02 | Interpret data, evaluate processes and generate solutions to well defined or abstract problems                   |
| 03 | Critically evaluate process induced defects and provide engineering design solutions for their elimination.      |
| 04 | Analyze, specify and design suitable processing parameters/geometries for polymer melt processing operations.    |
| 05 | Demonstrate analytical skills, problem solving skills, design skills and practical skills in polymer processing. |

### Learning, Teaching and Assessment Strategy

Lectures:  
Concepts, principles and theory are developed in, interactive lectures. All

lectures will be delivered online. Face to face tutorial meetings with individual groups will be set up to provide further support and guidance, as appropriate, complemented by online tutorials. Concepts are applied and explored further in set tutorials. The tutorials and solution are provided for formative feedback to allow student to assess and calibrate their understanding of the topics covered.

#### Laboratory demonstrations:

Presented theory is reinforced by laboratory sessions. Laboratory demonstrationss provide experience in REX and characterisation techniques. Leading edge developments covered by invited specialists and staff engaged in research.

Coursework assessment examines the wider learning outcomes ( LO3, LO4, LO5 ) and a student's ability to apply the principles and knowledge learnt to practical engineering tasks.

Knowledge and understanding of the specific LO 1, LO2, LO3 and LO4 will be assessed by examination.

This module satisfies the below Learning Outcomes as specified by the Accreditation of Higher Education Programmes: Fourth Edition (AHEP4) as published by the Engineering Council in-line with the UK Standard for Professional Engineering Competence (UK-SPEC). These outcomes specify five key areas of learning which partially (C) or fully (M) meet the academic requirement for CEng registration: Science and Mathematics (1), Engineering Analysis (2-4), Design and Innovation (5-6), The Engineer and Society (7-11), and Engineering Practice (12-18). Further details of these learning outcomes can be found at <https://www.engc.org.uk/ahep/>

M1, M2, M4, M5, M12, M13, M14, M16, M17,

| Mode of Assessment |                           |                                                                                                                          |                |     |
|--------------------|---------------------------|--------------------------------------------------------------------------------------------------------------------------|----------------|-----|
| Type               | Method                    | Description                                                                                                              | Weighting      |     |
| Summative          | Examination - Closed Book | Examination of taught material (1.5 hours)                                                                               | 1 hour 30 mins | 50% |
| Summative          | Coursework                | Individual coursework based on lab research project to investigate reactive extrusion and its effect on polymer property |                | 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.*