

Module Details	
Module Title	Polymer and Materials Engineering
Module Code	CPE7012-B
Academic Year	2020/1
Credits	20
School	Department of Chemical Engineering
Subject Area	Chemical and Process Engineering
FHEQ Level	FHEQ Level 7
Pre-requisites	N/A
Co-requisites	N/A

Contact Hours	
Type	Hours
Online Lecture (Synchronous)	22
Practical Classes or Workshops	10
Tutorials	4
Online Tutorials (Synchronous)	4
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

Outcome Number	Description
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.
4	Analyze, specify and design suitable processing parameters/geometries for polymer melt processing operations.
5	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 demonstrations 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 a 24 hour open book examination.

This module satisfies the below Learning Outcomes as specified by the Accreditation of Higher Education Programmes: Third Edition (AHEP3) as published by The Engineering Council in-line with the UK Standard for Professional Engineering Competence (UK-SPEC). These outcomes specify six key areas of learning: Science and Mathematics (SM), Engineering Analysis (EA), Design (D), Economic, Legal, Social, Ethical and Environmental Context (EL), Engineering Practice (P) and Additional General Skills (G).

SM1m, SM2m, SM3m, SM4m, SM5m, SM6m, EA1m, EA3m, EA4m, EA5m, EA6m, D3m, D6, D7m, D8m, EL1m, P2m, P9m, P11m, G3m, SM7M, SM8M, SM9M, EA6M, EA7M, D9M, D10M, D11M, EL8M, EL9M, EL11M, EL12M, EL13M, P12M.

Further details of these learning outcomes can be found at <https://www.engc.org.uk/>.

Mode of Assessment				
Type	Method	Description	Length	Weighting
Summative	Examination - Open Book	Examination of taught material	1 hour 30 mins	50%
Summative	Coursework	Individual coursework based on lab research project to investigate reactive extrusion and its effect on polymer properti	N/A	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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