

COMPOSITES CURRICULUM - Unit Information

This unit forms part of the Masters level Composites Curriculum developed by Bristol and Plymouth Universities.

Taught block title	Manufacturing Processes B	
Unit title	Polymeric Matrices	
Level (Credit points)	M (2)	
Unit director	Dr Edward Archer, Dr Alistair McIlhagger, Ulster University	
Unit description		
<p>This unit forms part of the Masters level Composites Curriculum. It enables learners to critically appraise alternative thermoplastic and thermoset conversion and fabrication processing routes. Through analysis of the mechanical and physical characteristics of polymers, students should be capable of developing an appropriate strategy for selection of processing routes for a range of material systems and applications. The course will impart an understanding of the polymers at a basic molecular level, but be delivered from a polymer composite engineering perspective rather than polymer chemistry.</p>		
Core subjects to be covered		
<ol style="list-style-type: none"> 1. Introduction to Polymers 2. Mechanical Properties of Polymeric Materials 3. Molecular arrangement 4. Viscoelasticity and Toughness 5. Crystallinity and Glass transition 6. Thermoplastic Composites 7. Basic principles of operation of injection moulding, blow moulding, extrusion, etc. 8. Productivity issues 9. Temperature control and heating/cooling 10. Thermoset matrix properties 11. Thermoplastic matrix properties 	<ol style="list-style-type: none"> 12. Time-dependent response and creep 13. Environmental stress cracking 14. Polymer Testing and Identification 15. Thermal analysis and rheology 16. Recycling strategies 17. Development areas and future research 	
Statement of unit aims		
<p>The aims of this unit are to:</p> <ol style="list-style-type: none"> 1. Provide Learners with an overview of the polymer types used in the composites sector 2. Identify the advantages and limitations of polymer processing methods 3. Explore aspects of polymer testing and analysis methods 4. Provide the learners with information to support the design of polymer composite products with consideration of environmental effects and time-dependent response. 		
Statement of learning outcomes		
<p>Learners will be able to:</p> <ol style="list-style-type: none"> 1. Provide a clear overview of thermoplastic and thermoset polymer composite fabrication processes and to assess the relative potential of alternative process routes for particular products and their design 2. Understand the features of polymer processes and how these may be optimised 3. Understand the issues and methodologies involved in the selection and design of polymers for composite products 		
Methods of teaching	6 lectures, 2 lab classes and demonstrations, 1 class exercise	
Assessment details if required	Written assignment (85%), 20 minute assessed presentation (15%)	
Timetable information	2 days of teaching in a block	