

### COMPOSITES CURRICULUM - Unit Information

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

<b>Taught block title</b>	Performance A	
<b>Unit title</b>	Mechanical properties and testing - anisotropic elasticity	
<b>Level (Credit points)</b>	H (2)	
<b>Unit director</b>	Dr. Nuri Ersoy	
<b>Unit description</b>		
<p>This unit forms part of the Masters level Composites Curriculum. It provides Learners with no prior experience with composites with a general introduction to the basic mechanical properties and how they can be obtained through standardized testing.</p>		
<b>Core subjects to be covered</b>		
<ol style="list-style-type: none"> <li>1. Orthotropic materials</li> <li>2. Transverse isotropy</li> <li>3. Engineering properties of orthotropic and transversely isotropic materials</li> <li>4. Testing standards for Mechanical Properties of Composites</li> <li>5. Test Specimen Preparation, Strain, and Deformation</li> <li>6. Measurement Devices, and Testing Machines</li> <li>7. Specimen Preparation and Tab Bonding</li> <li>8. Strain and Displacement Measurements</li> <li>9. Testing Machines</li> </ol>	<ol style="list-style-type: none"> <li>10. Tension Test Procedure (ASTM 3039)</li> <li>11. Compression Test Procedures               <ol style="list-style-type: none"> <li>1. IITRI Test Procedure (ASTM D 3410)</li> <li>2. ASTM D 695 Test Procedure</li> </ol> </li> <li>12. CLC Test Procedure (ASTM D 6641) Shear Testing               <ol style="list-style-type: none"> <li>1. Iosipescu Shear Test Method (ASTM D 5379)</li> <li>2. Two-Rail Shear Test Method (ASTM D 4255)</li> <li>3. Three-Rail Shear Test Method (ASTM D 4255)</li> <li>4. [±45]ns Tensile Shear Test Method (ASTM D 3518)</li> <li>5. Short Beam Shear Test Method (ASTM D 2344)</li> </ol> </li> </ol>	
<b>Statement of unit aims</b>		
<p>The aims of this unit are to:</p> <ol style="list-style-type: none"> <li>1. Provide Learners with an overview of the concepts of isotropy, orthotropy, and transverse isotropy</li> <li>2. Identify the engineering constants required to define isotropic, orthotropic, and transversely isotropic materials</li> <li>3. Provide the learners with an understanding of testing machines, measuring devices, and specimen preparation</li> <li>4. Give learners an understanding of the standardized test methods to measure the engineering properties of composites</li> </ol>		
<b>Statement of learning outcomes</b>		
<p>Learners will be able to:</p> <ol style="list-style-type: none"> <li>1. Acquire an understanding of the mechanical properties of unidirectional fibre reinforced composite materials</li> <li>2. Identify the tests methods required for mechanical characterization of these materials</li> </ol>		

<p>3. Comprehend how these materials fail under pure tension, compression and shear loading.</p> <p>4. Have a preliminary consideration of how the properties measured relate to stress and strength analysis of composite laminates</p>	
<b>Methods of teaching</b>	5 lectures, 3 lab classes and demonstrations, 1 class exercise
<b>Assessment details if required</b>	Written assignment (85%), 20 minute assessed presentation (15%)
<b>Timetable information</b>	2 days of teaching in a block