

## Composites Curriculum – Unit information

<b>Taught block title</b>	Manufacturing Operations B	
<b>Unit title</b>	Joining & Assembly	
<b>Level (Credit points)</b>		
<b>Unit director</b>	Dr. Hamed Yazdani Nezhad	
<b>Unit description</b>		
The unit provides a knowledge-based, industrial-oriented taught module on assembly and joining of high-performance composite structures, via providing theoretical framework and common practices for composite joints and assemblies.		
<b>Core subjects to be covered</b>		
<ol style="list-style-type: none"> <li>1. Introduction to composite structural Integrity</li> <li>2. Best Practices in Bonding, Bolting and Assembly Approaches</li> <li>3. Thermoplastic welding</li> <li>4. Material removal and surface preparation</li> <li>5. Mechanical performance of bolted and bonded assemblies</li> <li>6. Stress distribution in adhesively bonded composite joints</li> <li>7. Load path eccentricity in composite joints</li> <li>8. Plastic behaviour of composite joints</li> <li>9. Adhesive Bond Damage Tolerance and Failure Assessment</li> <li>10. Fatigue failure in bolted and bonded joints</li> <li>11. Bond failure in environmental conditions</li> </ol>	<ol style="list-style-type: none"> <li>12. Process-induced Defects in Composite fastening and bonding</li> <li>13. NDT of composite assemblies</li> <li>14. Stresses in fasteners and bonds</li> <li>15. Strength variation along degrading interface</li> <li>16. Correlation between defect type and failure mode</li> <li>17. Cohesion failures</li> <li>18. Adhesion failures</li> <li>19. Mixed-mode failures</li> <li>20. Mechanism of interfacial degradation</li> <li>21. Stress in doubler bonded assemblies</li> <li>22. Adhesive failure by shear or peel</li> <li>23. Design of adhesively bonded composite assemblies</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 intense knowledge-based industrial oriented learning sessions on composite integration and joining</li> <li>2. Provide deterioration mechanisms occurring in processing and assembly of composite materials and structures.</li> </ol>		
<b>Statement of learning outcomes</b>		
<p>Learners will be able to:</p> <ol style="list-style-type: none"> <li>1. Appreciate a variety of integration, repair and joining procedures in composite structures from fastening, thermoset adhesive bonding to thermoplastic welding</li> <li>2. Understand deterioration mechanisms occurring in processing and assembly of composite materials and structures.</li> <li>3. Learn about adhesive bond damage tolerance and failure assessment procedures.</li> </ol>		
<b>Methods of teaching</b>	9 lectures Inc. 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	