



## MODULE SPECIFICATION

| Part 1: Information       |  |                    |                                     |
|---------------------------|--|--------------------|-------------------------------------|
| Module Title              | Composite Engineering                  |                    |                                     |
| Module Code               | UFMFU6-15-3                            | Level              | Level 6                             |
| For implementation from   | 2018-19                                |                    |                                     |
| UWE Credit Rating         | 15                                     | ECTS Credit Rating | 7.5                                 |
| Faculty                   | Faculty of Environment & Technology    | Field              | Engineering, Design and Mathematics |
| Department                | FET Dept of Engin Design & Mathematics |                    |                                     |
| Contributes towards       |  |                    |                                     |
| Module type:              | Standard                               |                    |                                     |
| Pre-requisites            | None                                   |                    |                                     |
| Excluded Combinations     | None                                   |                    |                                     |
| Co- requisites            | None                                   |                    |                                     |
| Module Entry requirements | None                                   |                    |                                     |

| Part 2: Description  |  |
|--|--|
| <p><b>Overview:</b> The course aims to provide a rounded understanding of composite engineering (design, manufacture and performance) so that students are competent with the subject when they work in industry.</p> <p><b>Educational Aims:</b> See Learning Outcomes</p> <p><b>Outline Syllabus:</b> Classification and structure of composite materials, composition and structural relationships.</p> <p>Matrix materials: thermoplastic and thermosetting polymer, ceramic and metallic.</p> <p>Reinforcing materials: fibres and particulates, including carbon, glass, aramid, boron, metallic and ceramic.</p> <p>Fabric materials: woven, stitched, chopped mats and 3D fabrics.</p> |  |

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Core materials: honeycombs and foams.

Joining of composite materials: bonded and bolted joints.

Manufacturing processes: main methods, influence on material properties, quality, volumes and cost.

Design for manufacture and assembly.

Calculation of physical and mechanical properties: rule of mixtures, Hart-Smith, simplified classical laminate analysis method.

Design of composite structures: fundamental principles, design guidelines, balance, symmetry, thickness law.

Testing of composite materials: reasons for importance, destructive and nondestructive methods.

Performance of composite structures: tension, compression, bending, shear, impact toughness, fatigue, failure criterion.

Sustainability and recycling of composites: natural fibres and matrices, reduced weight, conflicts.

**Teaching and Learning Methods:** Contact: 36 hours

Assimilation and development of knowledge: 75 hours

Problem solving: 11 hours

Examination preparation: 28 hours

Total: 150 hours

Large group lecture supported by laboratory sessions. Study time outside of contact hours will be spent on going through exercises and example problems.

Scheduled learning: lectures and a laboratory based design, manufacture, analyse and test learning cycle project.

Independent learning: essential reading, preparation, e-learning activity and assessment, assignment preparation and completion.

### Part 3: Assessment

The examination (component A) is summative and assesses the students' understanding of concepts and techniques, and their ability to apply them to relatively straightforward problems.

The coursework is both summative and formative. The computer based tests assess competency and breadth of understanding of composite materials. The assignment provides the students with the opportunity to apply composite theory, develop a hands-on understanding of the materials and manufacturing process and test their understanding of the course material through an applied learning cycle. Feedback from the coursework is intended to assist students with their preparations for the end-of-year examination.

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| First Sit Components            | Final Assessment | Element weighting | Description  |
|---------------------------------|------------------|-------------------|--|
| Portfolio - Component B         |                  | 37 %              | Assignment on design, manufacture and and test of composites |
| Online Assignment - Component B |                  | 13 %              | E-learning assessment on composite materials                 |
| Examination - Component A       | ✓                | 50 %              | Examination ( 2 hours)                                       |
| Resit Components                | Final Assessment | Element weighting | Description  |
| Portfolio - Component B         |                  | 50 %              | Assignment on design, manufacture and test of composites     |
| Examination - Component A       | ✓                | 50 %              | Examination (2 hours)  |

| Part 4: Teaching and Learning Methods |   |     |
|---------------------------------------|---|-----|
| Learning Outcomes                     | On successful completion of this module students will be able to:   |     |
|                                       | <b>Module Learning Outcomes</b>   |     |
|                                       | MO1 Justify the selection of optimum materials for particular applications  |     |
|                                       | MO2 Critically analyse the inter-relationship between manufacturing process, material properties, quality and cost                  |     |
|                                       | MO3 Design optimum solutions with composite materials   |     |
|                                       | MO4 Calculate the physical and mechanical properties of composite materials and justify their advantages over metallic solutions    |     |
|                                       | MO5 Appraise the performance and discuss the key conflicts with composite materials with regard to sustainability and recyclability |     |
| Contact Hours                         | <b>Contact Hours</b>  |     |
|                                       |   |     |
|                                       | <b>Independent Study Hours:</b>   |     |
|                                       | Independent study/self-guided study   | 114 |
|                                       | <b>Total Independent Study Hours:</b>   | 114 |
|                                       | <b>Scheduled Learning and Teaching Hours:</b>   |     |
|                                       | Face-to-face learning   | 36  |
|                                       | <b>Total Scheduled Learning and Teaching Hours:</b>   | 36  |

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|              |  |     |
|--------------|--|-----|
|              | <b>Hours to be allocated</b>   | 150 |
|              | <b>Allocated Hours</b>   | 150 |
| Reading List | <i>The reading list for this module can be accessed via the following link:</i><br><a href="https://uwe.rl.talis.com/modules/ufmfu6-15-3.html">https://uwe.rl.talis.com/modules/ufmfu6-15-3.html</a> |     |