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| <b>Module code</b>   | TM-4302   |  |              |
| <b>Module Title</b>  | Sustainable Design and Manufacturing Systems    |  |              |
| <b>Degree/Diploma</b>  | Bachelor of Engineering (Manufacturing Systems) |  |              |
| <b>Type of Module</b>  | Major Option                                    |  |              |
| <b>Modular Credits</b>   | 2   | <b>Total student Workload</b>  | 4 hours/week |
|  |   | <b>Contact hours</b>   | 2 hours/week |
| <b>Prerequisite</b>  | None  |  |              |
| <b>Anti-requisite</b>  | None  |  |              |
| <b>Aims</b>  |   |  |              |
| To expose students to the principles of sustainability for product design, development and manufacture in order to implement the strategic move away from conventionally-designed and manufactured products to encourage a future green economy.   |   |  |              |
| <b>Learning Outcomes</b>   |   |  |              |
| <i>On successful completion of this module, a student will be expected to be able to:</i>  |   |  |              |
| Lower order:   | 30%   | <ul style="list-style-type: none"> <li>- describe the concept of sustainable design for manufacturing in the engineering context</li> <li>- comprehend the definitions of sustainability and sustainable design</li> </ul>   |              |
| Middle order:  | 30%   | <ul style="list-style-type: none"> <li>- apply the principles of sustainability to product design</li> <li>- analyse the environmental impact of conventional vs. sustainable design and manufacture</li> </ul>  |              |
| Higher order:  | 40%   | <ul style="list-style-type: none"> <li>- justify the need of implementation of sustainable materials in manufacturing</li> <li>- evaluate life cycle modelling for products</li> <li>- compute Impact assessments and sustainability analysis using tools and computational methods</li> <li>- work cooperatively in groups when reviewing case studies</li> </ul> |              |
| <b>Module Contents</b>   |   |  |              |
| <ul style="list-style-type: none"> <li>- Overview to Sustainable Design and Sustainable Manufacturing</li> <li>- Sustainability &amp; Sustainable Development</li> <li>- Principles of Eco Product Design &amp; Development</li> <li>- Product Life Cycle Design &amp; Management</li> <li>- Life Cycle Modelling &amp; Analysis</li> <li>- Eco Efficiency: Energy Efficiency &amp; Resource Management</li> <li>- Energy Modelling of Manufacturing Processes</li> <li>- Remanufacturing</li> <li>- Eco Innovation: Eco Product Design &amp; Innovation</li> <li>- Eco Materials &amp; Their Applications in Product-Service Design and Manufacture</li> <li>- Closed-Loop Manufacturing Systems</li> <li>- Tools &amp; Methods for Impact Assessment &amp; Sustainability Analysis</li> <li>- Sustainable / Renewable Energy Options</li> <li>- Sustainable Design and Manufacture Case Studies</li> </ul> |   |  |              |
| <b>Assessment</b>  | Formative assessment                            | Monthly online multiple choice questions will be used to test and to give feedback for their learning  |              |
|  | Summative assessment                            | Examination: 40%<br>Coursework: 60% <ul style="list-style-type: none"> <li>- 2 class tests (15% each)</li> <li>- 3 individual written assignments (10% each)</li> </ul>  |              |