Course Name (English)	DESIGN AND ENGINEERING OF BIO-COMPOSITE MATERIALS APPROVED
Course Code	BCT515

MQF Credit	3

Course Description	This course introduces students to various design and engineering aspects of bio-composite materials. The topics include basic concepts of bio-composite materials, specific gravity and moisture content, elastic properties and stiffness, plastic behaviour and strength, rheological characteristics, dynamic behaviour, failure, layered bio-composite systems, beam design principles, column design principles, and fasteners and connectors.

Transferable Skills	1. The students are able to understand basic concepts and theories in the design and engineering of bio-composite materials. 2. The students are able to apply these various concepts and theories in designing and engineering of bio-composite materials and products. 3. The students are exposed to the bio-composite technology available locally.

Teaching Methodologies	Lectures, Blended Learning, Demonstrations, Case Study, Tutorial, Discussion, Presentation

CLO	CLO1	1. The students are able to understand basic concepts and theories in the design and engineering of bio-composite materials.
	CLO2	2. The students are able to apply these various concepts and theories in designing and engineering of bio-composite materials and products.
	CLO3	3. The students are exposed to the bio-composite technology available locally.

Pre-Requisite Courses	No course recommendations

Topics

1. Bio-composites
1.1) Introduction
1.2)
1.3) Classification of Bio-composite Materials
1.4)
1.5) Modified Wood.
1.6)
1.7) Layered Composites
1.8)
1.9) Particle Composites
1.10)
1.11) Fibre Composites

2. Basic stresses and strength grouping
2.1) Definition of basic stress and strength grouping
2.2)
2.3) Behavior of anisotropic materials
2.4)
2.5) Derivation of basic stresses
2.6)
2.7) Development of strength grouping

3. Stress grading and grade stresses
3.1) Stress grading
3.2)
3.3) Strength ratio
3.4)
3.5) Derivation of grade stresses

4. Design of loads
4.1) Concept of load design
4.2)
4.3) Classifications of loads and tributory areas
4.4)
4.5) Design of dead loads and live loads

5. Design of bending members
5.1) Bending
5.2)
5.3) Horizontal Shear
5.4)
5.5) Deflection
5.6)
5.7) Beam Design Procedure
5.8)
5.9) Bearing on Supports
5.10)
5.11) Floor Joist
5.12)
5.13) Decking
5.14)
5.15) Methods of super positioning
5.16)
5.17) Design of bamboo flexural members
5.18)
5.19) Transformed-section method
5.20)
5.21) Design of composite beams

6. Design of compression and tension members
6.1) Column Types
6.2)
6.3) Slenderness Ratio
6.4)
6.5) Simple Solid Columns
6.6)
6.7) Spaced Columns
6.8)
6.9) Tie member design
6.10)
6.11) Design of trusses

7. Design of joints
7.1) Fasteners
7.2)
7.3) Connectors
7.4)
7.5) Design of Fasteners and Connectors
7.6)
7.7) Adhesives
7.8)
7.9) Design of Glues Joints

Assessment Breakdown	%
Continuous Assessment	55.00%
Final Assessment	45.00%

Details of Continuous Assessment	Assessment Type	Assessment Description	% of Total Mark	CLO
	Assignment	3 monthly test, quizs and home assignments	55%	CLO1 , CLO2 , CLO3

Reading List	Recommended Text	• **C.J. Mettem 1989, *Structural Timber Design and Technology*, 1st Ed., All, Longman Scientific and Technical England** • **Donald E. Breyer,Kenneth J. Fridley,Kelly E. Cobeen 1999, *Design of Wood Structures ASD*, 4th Ed., 16, McGraw-Hill Professional Publishing USA [ISBN: 0-07-007716-9]** • **USDA 2000, *Wood Handbook: Wood as an Engineering Material*, Centennial edition Ed., 10, OSDA USA [ISBN: 10-0898750822]** • **Jules J. A. Janssen 2003, *Building with bamboo*, 2nd Ed., 11, Intermediate Technology UK [ISBN: 1-85339-203-0]**
Article/Paper List	This Course does not have any article/paper resources	
Other References	This Course does not have any other resources	