

MS4622 – Composite Materials

Course Code	MS4622				
Course Title	Composite Materials				
Pre-requisites	MS2013	Polymers and Composites			
Pre-requisite for	NIL				
No of AUs	3				
Contact Hours	LECTURES	26	Tutorials	13	
Course Aims					
<p>Composite materials are multi-phase materials obtained by artificial combination of different materials, so as to attain properties that the individual components by themselves cannot attain. The physical and chemical properties of composites strongly depend not only on their compositions but also on their structure, morphology, phase, shape, size, distribution, and spatial arrangement.</p> <p>The main objective of this course is not only to enlarge your knowledge in functional composite materials (the functions include structural/traditional, thermal, electrical, electromagnetic, thermoelectric, electromechanical, dielectric, magnetic, optical, electrochemical and biomedical), but also to empower the students with the skills needed for the design, manufacture and analysis of composite materials from a material scientist's viewpoint.</p>					
Intended Learning Outcomes (ILO)					
<p>By the end of this course, you (as a student) would be able to:</p> <ol style="list-style-type: none"> 1. Articulate the basic concepts and types of composite materials with examples. 2. Describe basic concepts of the composite matrix (polymer, metal, and ceramic) with pros and cons. 3. Classify the different fiber types and fiber spinning processes. 4. Explain how different types of bonding affect the interfaces. 5. Apply knowledge to explain the behavior of unidirectional composites. 6. Classify the types of metal matrix composites and respective processes. 7. Explain the processing of ceramic matrix composites. 8. Describe the basic processes to fabricate polymer matrix composites. 9. Evaluate various nanocomposites based on their applications. 10. Reflect the concept of biomaterials (biocomposites, biofiber, etc.) to discuss future market opportunities. 					
Course Content					
This course introduces composite materials at a more advanced level.					

1. Structural composite materials (reinforcements, interfaces, polymer matrix composites, ceramic matrix composites, and ceramic matrix composites)
2. Non-structural composite materials (bio-application, electric and optical application, thermoelectric applications)

Reading and References

1. Krishan K. Chawla, Composite Materials. 2nd Edition, Springer Press, 2001.
2. Deborah D. L. Chung, Composite Materials: Science and applications, Springer, 2004.
3. Harsuo Ishida Characterization of composite materials, Butterworth Heinemann, 1994.
4. Navin Chand and Mohammed Fahim, Tribology of natural fiber polymer composites, CRC Press, 2008.

Course Policies and Student Responsibilities

(1) CA

Absentees must be supported by a medical certificate or other valid official documents

Academic Integrity

Good academic work depends on honesty and ethical behavior. Quality of your work as a student relies on adhering to the principles of academic integrity and to the NTU Honor Code, a set of values shared by the whole university community. Truth, Trust and Justice are at the core of NTU's shared values.

As a student of NTU, it is important that you recognize your responsibilities in understanding and applying the principles of academic integrity in all the work you do at the University. Not knowing what is involved in maintaining academic integrity does not excuse academic dishonesty. You need to actively equip yourself with strategies to avoid all forms of academic dishonesty, including plagiarism, academic fraud, and collusion and cheating. If you are uncertain of the definitions of any of these terms, you should go to the [academic integrity website](#) for more information. Consult your instructor(s) if you need any clarification about the requirements of academic integrity in the course.