MS4650 – Functional Nanostructured Materials

Course Code	MS4650					
Course Title	Functional Nanostructured Materials					
Pre-requisites	MS4014	Nanomaterials Fundamentals and Applications				
Pre-requisite for	NIL					
No of AUs	3					
Contact Hours	Lectures	26	Tutorials	13		

Course Aims

The purpose of this course is to provide the students some detailed knowledge of functional nanostructured materials, such as self-assembled nanoparticles and their applications, nanoporous materials and their production, and nano-sized biomaterials and their functions.

Intended Learning Outcomes (ILO)

By the end of this course, you (as a student) would be able to:

1. Identify common interactions between molecules and nanoparticles;
2. Describe general synthesis and fabrication techniques for functional nanomaterial systems covered in the course
3. Describe structures of the nanomaterial systems and identify suitable techniques for structural characterization
4. Explain the relationship between the structures and properties
5. Give applications of these functional nanostructured materials with examples
6. Define micelles and describe the building blocks of micelles
7. Explain how micelles are formed through micellization thermodynamics
8. Describe the formation of bilayers and contrast them from micelles
9. Define liposomes and illustrate the synthesis process of liposomes
10. Describe the principles of self-assembly at interfaces of Langmuir-Blodgett (LB) Film and Self-Assembled Monolayer (SAM)
11. Discuss major applications of nanostructured materials in cosmetics and medicine

Course Content

General introduction of nanostructured materials. Case studies of nanomaterial systems in term of the synthesis, structures, characterization and applications; for example, synthesis and characterization of nanoporous materials for separation and purification applications; self-assembly of various nanostructured materials such as micelles, bilayers and liposomes

and their use for medical and cosmetic applications.

Reading and References

1. Cao Guozhong, Nanostructures and Nanomaterials -Synthesis, Properties and Applications, Imperial College Press, 2004
2. Yoon, S. Lee, Self-Assembly and Nanotechnology: A Force Balance Approach, Wiley, 2008

Course Policies and Student Responsibilities

For CAs, all non-attendance 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.