

### MS4611 – Biomedical Devices

<b>Course Code</b>	MS4611				
<b>Course Title</b>	Biomedical Devices				
<b>Pre-requisites</b>	MS3011	Metallic & Ceramic Materials			
	MS4013	Biomaterials			
<b>Pre-requisite for</b>	NIL				
<b>No of AUs</b>	3				
<b>Contact Hours</b>	LECTURES	26	Tutorial	13	

#### **Course Aims**

The course aims to enable you to:

1. Demonstrate an understanding on a broad range of biomedical devices (e.g. cardiovascular devices, orthopaedic implants, ophthalmologic devices, and tissue implants)
2. Appreciate the issues relating to the materials selection, design considerations, sterilization requirements, biocompatibility, and contemporary challenges within the context of biomedical devices development.

#### **Intended Learning Outcomes (ILO)**

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

1. Define and classify different types of biomedical devices categories
2. Discuss structural organisation and functions of featured organs
3. Explain the working principles and design considerations of featured biomedical devices
4. Explain thermodynamics of proteins-materials interaction and factors influencing this process
5. Describe the physiological wearing and degradation mechanisms of implants
6. Discuss the concept of biocompatibility with reference to host-device interaction and tissue response
7. Distinguish the different biomedical device sterilization techniques in terms of their working mechanisms and suitability for different classes of biomaterials and/ or device
8. Describe the different types of test methods to evaluate biological performance of biomedical devices
9. Apply engineering and analytical concepts to critique performance and failures of polymeric, ceramic, and metallic devices.

## Course Content

Biomedical implants and devices; host-material interaction and tissue responses; biomedical device sterilization; Biosafety evaluation; in vivo performance and failures of biomaterials

## Reading and References

### Suggested reading:

Biomaterials Science: An Introduction to Materials in Medicine, 3rd Edition, edited by B.D. Ratner, A.S. Hoffmann, F.J. Schoen and J.E. Lemons, Academic Press, 2012.

### Additional reading:

Biological Performance of Materials, 4th Edition, J. Black, CRC Press, 2005.

Biocompatibility Assessment of Medical Devices and Materials, J.H. Braybrook, John Wiley & Sons, 1997.

Handbook of Biomaterials Evaluation: Scientific, Technical and Clinical Testing of Implant Materials, 2nd Edition, A.F. von Recum, CRC Press, 1998.

## 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.