

MS3011 – Metallic & Ceramic Materials

Course Code	MS3011				
Course Title	Metallic & Ceramic Materials				
Pre-requisites	NIL				
Pre-requisite for	MS3015	Materials Aspects in Design			
	MS4013	Biomaterials			
	MS4610	Advanced Biomaterials			
	MS4611	Biomedical Devices			
No of AUs	3				
Contact Hours	LECTURES	26 hrs	TUTORIALS	13 hrs	

Course Aims

This course deals with two important classes of engineering materials, i.e., metals and ceramics. You will study the structure, properties and applications of metals and alloys. The structure of ceramics will be studied and correlated with their properties and process.

Intended Learning Outcomes (LO)

On completion of the course, you shall be able to:

1. Describe Engineering applications of metals and alloys
2. Explain strengthening mechanisms in metals and alloys
3. Identify and describe microstructure and heat treatment of ferrous and selected non-ferrous alloys
4. Define and explain Atomic-, nano-, micro-structure, properties of typical ceramics.
5. List, discuss, apply and assess properties of ceramics materials
6. List, discuss, apply and assess process of ceramics materials
7. Analyse microstructure-property-structure relationship of ceramic.

Course Content

Introduction and classification of engineering metals and alloys. Strengthening mechanisms. Microstructure and heat treatment of ferrous alloys. Mechanical properties of ferrous alloys. Non-Ferrous alloys. Structures of ceramics, Properties of ceramics. Processing of ceramics. Property enhancement of ceramics, property-structure relationship of ceramic.

Reading and References

Suggested reading:

1. W.D, Callister, Materials Science and Engineering: An Introduction, Wiley, 2014
2. D. Henkel and A. Pense, Structure and Properties of Engineering Materials, 5th Edition, McGraw Hill, 2001.
3. R.E. Smallman, R. Bishop, Physical Metallurgy and Advanced Materials, 7th Edition, Butterworth-Heinemann, 2007.
4. M. Barsoum, Fundamentals of Ceramics, IOP publishing Ltd, 2003.

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 behaviour. The quality of your work as a student relies on adhering to the principles of academic integrity and to the NTU Honour 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, it is important that you recognize your responsibilities in understanding and applying the principles of academic integrity in all the work you do at NTU. 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, 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.