

New Course Code and Title	MS7110 History of Materials		
Course Coordinator	Asst Prof Tan Kwan Wee		
Details of course	Rationale for Introducing this course		
	<p>Technological innovations underlying engineering fields are driven by the field of material sciences. This course provides a historical perspective of the development of art, construction and technology from antiquity to the present day with an introduction to state-of-the-art technological innovations of various materials.</p> <p>The evolution of materials through the Stone, Bronze and Iron Ages will be contextualised with the benefit of modern understanding with a scientific foundation. Material systems (polymers, metals, ceramics, and composites) are developed sequentially to provide a framework to explain the fundamental, physical origins of observable and important macro and micro-scale properties.</p> <p>Issues surrounding long-term sustainability with respect to materials, including scarcity, recycling and pollution as well as the future of materials will be discussed.</p>		
	<p>Aims and Objective</p> <p>The aim of this course is to provide a historical perspective and introduce central concepts in the selection, design and testing of materials that will underpin the Master program.</p> <p>At the end of this course the students will be able to:</p> <ol style="list-style-type: none"> 1. Understand the range and uses of materials from the past to current day. 2. Appreciate past contributions to present day materials science and trace its development. 3. Develop a foundational understanding of Materials Science and Materials Engineering. 4. Develop an understanding of the potentials and limitations of materials. 		
Course Syllabus			
Refer to page 2 to 3			
Assessment (Individual Assessment)	Assessment Point	2	
	Mode of Assessment and Weighting	CA 1: case study 1 CA 2: case study 2	40% 60%
	Instructions		
	Mapping of Assessment	CA 1 – module 1 to 3 CA 2 – module 1 to 6	
To be offered with effect from	Semester 1 , Academic Year 2019/2020		

(state Academic Year and Semester)	
Cross Listing (if applicable)	N/A
Prerequisites (if applicable)	NIL
Mode of Teaching & Learning (Lectures, regular tests, Q&A, problem-based learning)	Lectures, Videos, tutorials, authentic texts, peer discussion.
Basic Reading List Compulsory Reading – NIL	<p>Supplementary Reading</p> <ol style="list-style-type: none"> 1. Sass, Stephen L. (2011). The Substance of Civilization Materials and Human History from the Stone Age to the Age of Silicon 2. Hunter-Duvar, John (2010). The stone, bronze and iron ages: a popular treatise on early archaeology (https://archive.org/stream/cihm_08455/cihm_08455_djvu.txt) 3. Bryson, B. (2003). A short history of nearly everything. New York : Broadway Books, 2003 (https://archive.org/stream/AShortHistoryofNearlyEverything_201706/AShortHistoryofNearlyEverything_djvu.txt) 4. Ball, Philip (1999). Made to Measure: New Materials for the 21st Century (NTU library) 5. Callister, W. D., & Rethwisch, D. G. (2014). Materials Science and Engineering. 9th Ed. SI version. Hoboken, NJ : John Wiley & Sons
Hours of Contact/Academic Units	13 hr/ 1 AU

Course Syllabus

The following are a list of tentative topics that will be covered:

MODULE 1: INTRODUCTION TO MATERIALS AND HUMANN HISTORY

Lecture 1: Why do Materials Matter?

Supplementary: Core Concepts

MODULE 2: CERAMICS

Lecture 1: It all Begins with Clay!

Lecture 2: Transformation of Clay into Ceramics

- Media Recording: Dragon Kiln, Asian Civilisations Museum

Lecture 3: The Art and Science of Historic Ceramics

Lecture 4: Glass is a Ceramic

- Media Recording: Asian Civilisations Museum

Lecture 5: From Pots to Space Shuttles – Advanced/Technical Ceramics

MODULE 3: METALS

- **Lecture 1:** Historical Metal Processing and Applications
 - Media Recording: Asian Civilisations Museum
- **Lecture 2:** State of the Art Technologies with Metals
 - Media Recording: Rolls Royce Corp Labs; Singapore Centre for 3D Printing
- **Lecture 3:** Case Study: Liberty Ship Failure in 1940s and other historic materials failures and State of the art Failure Analysis Lab
 - Media Recordings: Rolls Royce Seletar- Failure Analysis Lab

MODULE 4: POLYMERS

- **Lecture 1:** Natural Polymers: Gutta percha and rubber
 - Media Recording: NUS Lee Kong Chian Natural History Museum
- **Lecture 2:** Synthetic Polymers and Processing: Roll to Roll, Fiber Extrusion
 - Media Recording:
- **Lecture 3:** State-of-the-Art and Advanced Applications

MODULE 5: COMPOSITES

- **Lecture 1:** Natural Composites: Nacre, Wood, Paper
 - Media Recording: NUS Lee Kong Chian Natural History Museum
- **Lecture 2:** Synthetic Composites – Processing and Applications

- Media Recording: Interview with Associate Professor Sridhar Idapalapati; Interview with Assistant Professor Hortense Le Ferrand
- **Lecture 3:** State of the Art Synthetics Lab and 3D Bioprinting
 - Media Recording: Interview with Associate Professor Yeong Wai Yee

MODULE 6: SUSTAINABILITY

- **Lecture 1:** Sustainable Building Materials and Infrastructure
- **Lecture 2:** 3D Printing Technology
 - Media Recording: Singapore Centre for 3D Printing
- **Lecture 3:** Biomimetic Materials
 - Media Recording: NUS Lee Kong Chian Natural History Museum
- **Lecture 4:** Environmental Concerns, Pollution, Societal Issues and Future of Materials