<table>
<tr><td>New Course Code and Title</td><td colspan="3">MS7110 History of Materials</td></tr>
<tr><td>Course Coordinator</td><td colspan="3">Asst Prof Tan Kwan Wee</td></tr>
<tr><td rowspan="3">Details of course</td><td colspan="3">Rationale for Introducing this course

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.

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.

Issues surrounding long-term sustainability with respect to materials, including scarcity, recycling and pollution as well as the future of materials will be discussed.</td></tr>
<tr><td colspan="3">Aims and Objective

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.

At the end of this course the students will be able to:
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.</td></tr>
<tr><td colspan="3">Course Syllabus
Refer to page 2 to 3</td></tr>
<tr><td rowspan="4">Assessment (Individual Assessment)</td><td>Assessment Point</td><td colspan="2">2</td></tr>
<tr><td>Mode of Assessment and Weighting</td><td>CA 1: case study 1
CA 2: case study 2</td><td>40%
60%</td></tr>
<tr><td>Instructions</td><td colspan="2"></td></tr>
<tr><td>Mapping of Assessment</td><td colspan="2">CA 1 – module 1 to 3
CA 2 – module 1 to 6</td></tr>
<tr><td>To be offered with effect from</td><td colspan="3">Semester 1 , Academic Year 2019/2020</td></tr>
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(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	**Supplementary Reading** 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