1. **Course number and name**
   ENGR 200: Materials of Engineering

2. **Credits and contact hours**
   3 credit hours: two 50-minute lecture sessions/week and one 2-hour-45-minute laboratory session/week

3. **Instructor’s or course coordinator’s name**
   Instructor: Kwok Siong Teh, Associate Professor of Mechanical Engineering
   Course coordinator: Kwok Siong Teh, Associate Professor of Mechanical Engineering

4. **Text book, title, author, and year**
   a. other supplemental materials
      (none)

5. **Specific course information**
   a. **brief description of the content of the course (catalog description)**
      Application of basic principles of physics and chemistry to engineering materials; their structure and properties and the means by which these materials can be made of better service to all fields of engineering.

   b. **prerequisites or co-requisites**
      CHEM 115: General Chemistry I, or CHEM 180: Chemistry for the Energy and the Environment

   c. **indicate whether a required, elective, or selected elective course in the program**
      Required for Civil Engineering; required for Mechanical Engineering

6. **Specific goals for the course**
   a. **specific outcomes of instruction, ex. The student will be able to explain the significance of current research about a particular topic.**
      - The student will demonstrate an ability to describe and solve problems on atomic arrangements, geometry of imperfections, and atomic diffusion in solids.
      - The student will demonstrate an ability to describe and solve problems on mechanical and electrical behavior of materials.
      - The student will demonstrate an ability to submit homework solutions in proper engineering format.
      - The student will demonstrate an ability to describe and solve problems on the distinguishing properties of metals, plastics and ceramics.
      - The student will demonstrate a familiarity with the effects of thermal, mechanical, and chemical treatments on properties.
      - The student will demonstrate an ability to experimentally determine mechanical and electrical properties of materials.
• The student will demonstrate an ability to make oral presentations and write a technical report.

b. *explicitly indicate which of the student outcomes listed in Criterion 3 or any other outcomes are addressed by the course.*

Course addresses ABET Student Outcome(s): a, b, c, d, e, g, h, i, j, k.

7. *Brief list of topics to be covered*

• Atomic structure and bonding
• Crystal structures and geometry
• Mechanical properties of metals
• Crystal imperfections
• Strengthening mechanisms
• Heat treatment
• Solidification
• Diffusion
• Fracture mechanics
• Fatigue failure
• Creep
• Phase diagrams
• Phase transformation
• Engineering alloys
• Thermal processing of metals
• Polymers
• Composite materials
• Concrete mixing and testing
• Electrical properties of materials
• Semiconductors
• Contemporary topics in materials science