

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*
W. D. Callister. *Fundamentals of Materials Science and Engineering*, 8th ed., John Wiley & Sons, Inc., 2010.

b. other supplemental materials
(none)

5. *Specific course information*
 - d. *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.

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

 - f. *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*
 - c. *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.

d. *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