1. Course number and name
   ENGR 203: Materials of Electrical and Electronic Engineering

2. Credits and contact hours
   3 credit hours; three 50-minute lecture sessions/week or two 75-minute lecture sessions /week

3. Instructor’s or course coordinator’s name
   Instructor: Mohammad Hajiaboli, Lecturer in Electrical 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 electrical and electronic engineering materials. Conductors, insulators, and semiconductors; electrical conductors; mechanical properties of conductors; manufacturing conductors; electrochemistry; electrical insulators; plastics; magnetic materials; superconductors and optical fibers.
   b. prerequisites or co-requisites
      CHEM 115: General Chemistry OR
      CHEM 180: Chemistry for the Energy and the Environment
   c. indicate whether a required, elective, or selected elective course in the program
      Lower Division Engineering Elective for Electrical 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.
      • Students will demonstrate a good understanding of the characteristics, operation, and limitations of semiconductor devices
      • Students will demonstrate a good understanding of quantum mechanics and quantum theory of solids
      • Students will demonstrate a good understanding of the physics of the semiconductor in thermal equilibrium
      • Students will demonstrate a good understanding of the transport phenomena of the charge carriers in a semiconductor
      • Students will demonstrate a good understanding of the electrostatics of the basic PN junction
      • Students will demonstrate a good understanding of the current-voltage characteristics of the PN junction
• Students will demonstrate a good understanding of the basic physics of the metal-oxide-semiconductor field-effect transistor (MOSFET)

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, c, e, g, h, i, j, k.

7. Brief list of topics to be covered
• The crystal structure of solids
• Introduction to quantum mechanics
• Introduction to the quantum theory of solids
• The semiconductor in equilibrium
• Carrier transport phenomena
• The PN junction
• The PN junction diode
• Fundamentals of the MOSFET