Course Outline

1. Course number and name
   ENGR 854: Wireless Data Communication Standards

2. Credits and contact hours
   3 credit hours

3. Instructor's or course coordinator's name
   Instructor: T. Cooklev
   Course coordinator: Hao Jiang, Assistant Professor

4. Text book, title, author, and year

5. Specific course information
   a. brief description of the content of the course (catalog description)
      Capacity of communication channels. Link budget calculations. Government regulations. Standardization bodies. OSI networking model. Design of a wireless communication standard. Introduction to cryptographic algorithms. Wireless local area networks (802.11), Bluetooth, high-rate and low-rate wireless personal area networks (802.15) and wireless broadband access (802.16): medium-access control layers and physical layers. Quality of Service. Directions for future development of wireless data communication.

   b. prerequisites or co-requisites
      A grade of C or better in ENGR 449 for undergraduate students

   c. indicate whether a required, elective, or selected elective course in the program
      Elective for undergraduate students

6. Specific goals for the course
   a. Specific outcomes of instruction.
      • The student will demonstrate an understanding of government regulations, standardization bodies, link budgets, the design of a wireless communication standard and principles of spread-spectrum communications.
      • The student will demonstrate an understanding of IEEE 802.11 networks, Architecture of 802.11, the 802.11 MAC protocol, the different physical layers of 802.11, the Security and QoS protocols used in 802.11, and the throughput of 802.11
      • The student will demonstrate an understanding of IEEE 802.15.1 (Bluetooth) networks and architecture, the recommended practice for coexistence between 802.11b and 802.15.1, the IEEE 802.15.3 standard for high data rate wireless personal area network, and the 802.15.4 standard for low data rate wireless personal area network.
      • The student will demonstrate an understanding of IEEE 802.16 network and protocol architecture, the 802.16 MAC protocol, the different physical layers of 802.16 and interference problems in 802.16.
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, f, k].

7. _Brief list of topics to be covered_
   - Government regulations. Standardization bodies.
   - Wireless communication channels
   - Design of a wireless communication standard
   - Introduction to cryptography
   - IEEE 802.11 medium-access control (MAC) layer: security, medium-access procedure.
   - 802.11 physical layers
   - Novel developments within 802.11.
   - IEEE 802.15.1 (Bluetooth)
   - Coexistence between 802.15.1 and 802.11b
   - High-rate wireless personal area networking – IEEE 802.15.3
   - Low-rate wireless personal area networking – 802.15.4
   - Broadband wireless access – IEEE 802.16
   - 802.16 medium-access control layer
   - 802.16 physical layers
   - Interference and coexistence issues in 802.16