**EE469 Wireless Data Networks**

**Credits:** 3

**Categorization of credits:** engineering topic

**Instructor(s):** Mark Nelson.Yingfei Dong. Revised Jan. 14th, 2021.

**Textbook and Other Required Materials:**

None required, however material will be derived from *The Essential Guide to Telecommunications*, 5th Edition.

**Handouts/Notes and Supplemental Text:** will be available on-line or distributed in classes**.**

**Designation:** Technical Elective

**Catalog Description:**

Mobile agent’s platforms and systems, mobile agent-based service implementation, middleware, and configuration, wireless local area networks, wireless protocols, network architecture supporting wireless applications, routing protocols in mobile and wireless networks, handoff in mobile and wireless networks.

**Pre- and Co-requisites:** EE 344 “Networking I” and EE 367 “Computer Data Structures and Algorithms” or consent w/ equivalent of 2 semesters of programming.

**Class/Lab Schedule:** 3 lecture hours per week.

**Topics Covered:**

* Terrestrial telecommunications systems
* Voice over IP telecommunications systems
* Cellular voice & data communications (AMPS, GPRS, GSM, LTE and 5G)
* Mobile wireless protocols (Bluetooth, Zigbee, RFID, 802.11)
* Selected topics (telecom systems around the world, nontraditional carriers, software defined radios, mobile encryption standards)

**Labs and Exercises:**

* Circuit switched lab: Old school telephone service
* Encoding lab
* T1/E1 emulator labs 1 & 2: Dialplans, ISDN messaging & trunk configuration
* VoIP lab 1: Packet capture & analysis of voice call
* VoIP lab 2: Packet capture & analysis of SIP message flow
* GSM labs 1, 2 & 3
* Bluetooth & NFC & RFID lab
* 802.11 lab

**Grading**: The final grade will be based on:

* Midterm test 1 (20%)
* Midterm test 2 (20%)
* Weekly reading assignments, labs & assessments via Laulima (30%)
* Attendance / participation & Hex Drills (10%)
* Final exam: Comprehensive (20%)

**Course Objectives and Their Relationship to Program Objectives:**

Students will be able to: 1) understand the fundamentals of network communication methods and diﬀerentiate packet-switched and circuit-switched networks; 2) Understand the architectural diﬀerences between various generations of terrestrial, mobile and cellular technologies; 3) Identify the security properties and operational attributes of various wireless technologies. 4) Students also learn low-level wireless system skills to enhance their understanding of wireless communications. Class labs will help students to practice theor learning and gain solid experiences. [Program Objectives this course addresses: 1, 2, 3, and 5.]

**Course Outcomes and Their Relationship to Program Outcomes:**

The following are the course outcomes and the subset of Program Outcomes (numbered 1-7 in square braces "[ ]") they address:

* Understand the fundamental communication system design and methods [1].
* Understand analog-to-digital encoding of voice and digital-to-analog playback [2].
* Understand the basics of practical communication protocols and their implementations [1].
* Understand the basics of Voice over IP protocols and the similarities/diﬀerences with traditional telecommunications systems. [1].
* Understand the cellular telecommunications system to include: History, economics, future challenges, ethics [4].
* Learn modern communication modulation approaches and GSM/GPRS cellular voice and data protocol suites, and 5G mobility and the transition from LTE to 5G [1].
* Understand modern codecs and encryption standards [6].
* Learn real system such as smartphones, embedded operating systems and cellular data modems, and technologies to enable mobile data platforms to include: Bluetooth, Zigbee, RFID, 802.11 [1,6]
* Know nontraditional carriers: AIS, Satellites, EPIRB, Inmarsat, etc. [1].

**Contribution of Course to Meeting the Professional Component**

Computer System, computer networks, communication protocols and systems

**Computer Usage:**

Heavy computer usage is required.