Course Description
This course provides students with a technical understanding of the function and operation of wireless telecommunication systems. A wide variety of concepts, protocols, signaling types, modulation and terminology are included. Basic wireless skills and knowledge provide students with options in various specialty tracks for the employment market. This course focuses on wireless signaling to communicate voice and data used in the wireless cellular and personal communications services (PCS) industry. This course is usually offered in the spring.

Textbook: Rappaport, Wireless Communications: Principles and Practice, Prentice Hall 2nd Ed

COURSE OBJECTIVES, ASSESSMENT GOALS AND ASSESSMENT STRATEGIES

1. Identify essential network types, media, topologies, and connectivity devices.
   A. Explain the basics of Bus, Ring and Mesh topology.
   B. Describe the various uses for wireless LANs.
   C. Describe the methodology required to construct an office LANs.
   Assessment Strategy: Exam questions, quizzes and homework.

2. Describe the role of wireless networking.
   A. Explain the new developments in modem technologies.
   B. Explain the operation of cellular and PCS phone system.
   C. Discuss the evolution of the internet, the details of IP addressing, and IP telephony.
   Assessment Strategy: Exam questions, quizzes and homework.
3. Understand wireless technologies including satellite, cellular telephony, microwave, paging systems, and the global positioning navigation system.
   A. Describe spectrum band designations, frequency ranges, and electromagnetic wave spectrum.
   B. Explain the strengths and weaknesses of satellite communication.
   C. Describe the concepts of frequency reuse and cell splitting.
   D. Explain the cause of attenuation distortion.

Assessment Strategy: Exam questions, quizzes and homework.

4. Describe how various wireless technologies operate and how to apply the current systems.
   A. Explain frequency division multiple access (FDMA), time division Multiple access (TDMA), and code division multiple access (CDMA) techniques.
   B. Describe reflection, scattering, attenuation and diffraction factors that involves propagation of radio wave.
   C. Recognized the three main categories of interference signals in CDMA.

Assessment Strategy: Exam questions, quizzes and homework.

5. Combine in a Wireless design the various components of Wireless Application Protocol (WAP).
   A. List all the requirements of WAP architecture.
   B. Illustrate a WAP programming model similar to the WWW programming model
   C. Research and compare the WMLscripting language to JavaScript.
   D. Produce a five-page research paper summarizing the various components of WAP.

Assessment Strategy: Exam questions, quizzes and homework.

6. Describe the components and operation of Bluetooth standard.
   A. Explain the concept of inquiry procedure and paging procedure in Bluetooth.
   B. Define output power class in Bluetooth.
   C. Construct a drawing showing connectivity between three different Bluetooth devices.

Assessment Strategy: Exam questions, quizzes and homework.

7. Explain the various components and operation of cellular telephony.
   A. Illustrate the cellular frequency reuse and cell splitting concept.
   B. Calculate total number of channel per cell for allocated bandwidth.
   C. Define handoff, frequency reuse, trunking efficiency, and frequency planning concepts.

Assessment Strategy: Exam questions, quizzes and homework.

8. Use documentation, to specify telecommunications & antenna component characteristics.
   A. Calculate far-field distance for an antenna with given maximum dimension and operating frequency.
   B. Express the transmit power in units of dBm and dBW, and calculate unity Gain for the receiver antenna.

Assessment Strategy: Exam questions, quizzes and homework.
9. Describe the various uses for wireless LANs.
   A. Illustrate the evolution of IEEE 802.11 WLAN standards.
   B. Compare common wireless communication systems.
   C. Explain Nonaccess Point-Based and Access Point-Based RF LAN.
   Assessment Strategy: Exam questions, quizzes and homework.

10. Use RF theory in a lab exercise that demonstrates expertise with loss and gain, decibels, bandwidth, and frequency.
    A. Sketch a frequency spectrum diagram for various waveforms.
    B. Use Spectrum analyzer to measure power spectrum and bandwidth of various modulated waveform.
    Assessment Strategy: Exam questions, quizzes and homework.

11. Describe Radar and how Radar works.
    A. Provide a physical picture of waveguide propagation, including the concepts of guide wavelength and velocity.
    B. Explain the principle of operation for a radar system.
    C. Define target, echo, PRR, PRT, echo, rest time, range and Doppler effect with respect to radar system.
    Assessment Strategy: Exam questions, quizzes and homework.

12. Explain different Radar Systems (example Pulsed and Doppler).
    A. Calculate the peak power of a radar pulse.
    B. Compute the distance in miles and meters to a target under radar system.
    C. Discuss the various implication of duty cycle for a radar system.
    Assessment Strategy: Exam questions, quizzes and homework.

13. Use electronic test equipment, digital meters, oscilloscopes, power meters, spectrum analyzer, etc to test and measure different types of transmitters & receivers for test and calibration.
    A. Measure power spectrum and modulation index of AM transmitter.
    B. Measure frequency deviation of FM transmitter.
    C. Measure output power of AM receiver.
    Assessment Strategy: Exam questions, quizzes and homework.

14. Describe how the global positioning system operates.
    A. Discuss the various obstacles to radio transmission in deep space.
    B. Determine the azimuth and elevation angle for the earth station.
    C. Identify the two signals that GPS satellite transmit, and calculate the round trip time delay for a signal propagating from the earth station to satellite and back.
    Assessment Strategy: Exam questions, quizzes and homework.

*Note: Assessment Strategy: There is a required Graded Electronics Library Database assignment.
COURSE GUIDELINES
The course will be 2 hours lecture and 2 hours laboratory per week.

An Electronic library research paper exploring some aspect of Electronic Circuits will be required with the following minimum requirements: Reference from The electronic library database collection. Due week 12: Cover page with name, title and date; body with Introduction, report and summary. The paper shall be not less than three full pages, and a bibliography from the electronic library database page with a minimum of four total references.

COURSE EVALUATION
The grade will be based on 1000 points which will be divided as follows:
Electronic Library database Assignment = 50 points
Class Preparation & Participation = 50 points
Monthly Quizzes = 450 points
Competency = 100 Points
Comprehensive Final Exam = 200 points
Laboratory Exercises = 150 points
TOTAL 1,000 points

Letter grade will be assigned as follows: A = 900-1000 points, B = 800-899 points, C = 700-799 points, D = 600-699 points, F - Less than 600 points

ACADEMIC HONESTY POLICY:
Students are expected to maintain a high level of academic performance. Cheating and plagiarism are defined in the college catalog. Infractions of this policy will result in the student’s failure for the assignment or test.

H1N1 STATEMENT:
In the event of a flu epidemic or other emergency that results in the suspension of classes, faculty will be communicating with students about their courses and course requirements, such as assignments, quiz and exam dates, and class and grading policies, via faculty websites or Blackboard. Students will be responsible for completing all these assignments in accordance with class policies. Information about the resumption of classes will be communicated via the College’s website and email system.

STATEMENT CONCERNING USE OF BLACKBOARD IN COURSE:
Blackboard is being used as a supplementary site in this course. To access course content in Blackboard you need to have access to Internet connection, (other requirements may apply). Computers that meet these requirements are available on campus in MTC 200, AAB 217, HH 100, GH 204, WDC 305, and AHB 108.

Please follow these directions to access course syllabi and any other materials posted for this course:
Login Information:
Log in to myWor-Wic for access to the class Blackboard site. The Blackboard link can also be access at the bottom of the Wor-Wic homepage and under Quick link.
STATEMENT CONCERNING USE OF ACADEMIC INTEGRITY AND COMPUTER USAGE POLICY:
All students logging into Blackboard affirm that they understand and agree to follow Wor-Wic Community College policies regarding academic integrity and the use of College resources as described in the college catalog. Wor-Wic Community College considers the following as violations of the computer usage policy:

Using the campus computing network and facilities to violate the privacy of other individuals.

Sharing of account passwords with friends, family members or any unauthorized individuals. Violators are subject to college disciplinary procedures.