

SPRINGFIELD TECHNICAL COMMUNITY COLLEGE
ACADEMIC AFFAIRS

Course Number: BMT-230 Class/Lect. Hours: 3 Lab Hours: 3 Credits: 4 Dept.: Biomedical
Course Title: Bio-Medical Wireless Networks Semester: Spring Year: 2019

Course Description, Prerequisite, Corequisite:

This course will introduce the student to the fundamentals of wireless networks and transmission systems typically used in a clinical and/or home health care setting. Starting with an introduction to the concept of a wireless electronic communications system and its technical language, the student is quickly introduced to the ideas of RF signals, frequency bands used for communications, and digital modulation techniques. The function of system hardware (i.e. transmitter, receiver, transmission lines, and antennas) and the basics of electromagnetic (EM) propagation are presented and related to the particular communication system application and frequency band of operation. Basic networking concepts are reviewed and related to today's wireless standards. Present day wireless cellular technology (i.e. 4G and soon to be implemented 5G) are introduced first and then the IEEE wireless networking standards (including IEEE 802.11.X) are covered. Emphasis is placed on the personal area networking standard (IEEE 802.15.X) and applications involving wireless body area networks (WBANs) in individual health care applications. Students are introduced to basic test and measurement equipment used in this field and the fundamentals of wireless system operation evaluation.

Prerequisites: Senior Standing and CSCO-105 Introduction to Networking

Course Objectives	Competencies
-------------------	--------------

Course Objectives	Competencies
<p>1. To become familiar with the concept of a wireless electronic communications system/network</p>	<p>a. To be able to describe the purpose of a wireless network and the components used to construct such a system b. To be able to recognize the functions of the various components of a wireless network</p>
<p>2. To become familiar with the limitations of wireless networks due to various system impairments</p>	<p>a. To be able to demonstrate knowledge about system limitations due to noise and electromagnetic propagation properties</p>
<p>3. To become familiar with basic sub-systems of wireless networks and communications systems</p>	<p>a. To be aware of the functions of the various kinds of electronic filters b. To be aware of the operation of RF amplifiers, oscillators, mixers, frequency synthesizers, PLLs, A/D and D/A converters, SDRs, and detectors c. To be conversant with the use of dBs and referenced dBs</p>
<p>4. To become familiar with the concept of RF signals, communications frequency bands, and digital modulation</p>	<p>a. To be able to describe the concepts of RF signals and digital modulation b. To be able to demonstrate knowledge of the various frequency bands used for electronic communications and wireless networking in particular</p>
<p>5. To become familiar with the functions of electronic communications hardware</p>	<p>a. To be able to demonstrate a knowledge of wireless electronic transmitter, receiver, transmission line, and antenna hardware</p>
<p>6. To become familiar with the properties of electromagnetic propagation</p>	<p>a. To be able to demonstrate a knowledge of EM propagation characteristics</p>

Course Objectives	Competencies
<p>7. To become familiar with today's wireless networking systems</p> <p>8. To become familiar with typical wireless test and measurement equipment</p> <p>9. To become familiar with the techniques used to diagnose and evaluate the correct operation of wireless networks</p>	<p>a. To be able to demonstrate a knowledge of various wireless networking technologies including cellular, IEEE 802.11.X, and IEEE 802.15.X, and WBANs</p> <p>a. To be aware of the use and function of typical test equipment used in this field including: power meters, spectrum analyzers, and sniffer software like WireShark</p> <p>a. To be able to demonstrate the ability to correctly evaluate the proper operation of a wireless network</p>