CMP4204 Wireless Technologies

Period per Week			Contact Hour per Semester	Weighted Total Mark	Weighted Exam Mark	Weighted Continuous Assessment Mark	Credit Units
LH	PH	TH	CH	WTM	WEM	WCM	CU
30	30	00	45	100	60	40	3

Rationale

Interest in wireless technology is booming and wireless networks are enjoying very fast

growth. This course introduces students to advanced network concepts with application to wireless technologies. They will be introduced to various the wireless and mobile network- technologies and protocols with an emphasis on their utilization in various real world computing and communications situations.

Objectives

- To recap the OSI and the TCP/IP models and their application in computer networks
- To introduce to the student various wireless and mobile network- technologies and protocols with an emphasis on impact to various layers of the OSI stack.
- To introduce the students to the established and next generation wireless systems and introduce the scenarios where they compare and (possibly) complement each other.
- To sensitize the computer engineering student about the potential security concerns that arise when utilizing wireless systems and how to deal with them

Course Content

1. ***Introduction to Wireless Communications***
   - Major wireless technologies are used today
   - Applications of wireless technology
   - Pros and Cons of wireless technology
   - Wireless techniques used to transmit data
   - Spread spectrum Technology (FHSS and DSSS)
2. ***Radio communication systems and standards***
   - Factors affecting the design of radio system
   - Antenna Systems
   - Frequency allocation and modulation Techniques
   - Telecommunications Standards
   - Telecommunications standards organizations
3. ***Communications Models***
   - Difference between the OSI communications model and IEEE 802 communication standards.
   - TCP Communication model
4. ***Low- Speed Wireless Local Area Network***
   - Introduction to WLAN
   - Components and modes of a WLAN
   - WLAN and wireless media
   - The MAC frame format.
   - Function of an IEEE 802.11b Network
   - Discuss Mobile IP
   - Tell how IEEE 802.11a networks function, and how they differ from IEEE 802.11b networks
5. ***High Speed WLAN***
   - Mobile IP Technology
   - IEEE 802.11a networks
   - Difference between IEEE 802.11a and IEEE 802.11b networks
   - Advantages and Disadvantages of an IEEE 802.11g networks.
   - HiperLAN/2 networks.
   - Low speed and high speed WLANs
6. ***Personal Area Network (Bluetooth)***

- Introduction to Bluetooth
- Bluetooth network topology
- Piconet
- Bluetooth device profiles

7. ***Installing and securing an Adhoc network.***

- Installing, configuring and securing Infrastructure network
- Creating Adhoc networks using IEEE 802.11a, b and g client cards.
- Security features used in Adhoc networks
- Installing and securing an Adhoc network.
- Steps for setting up Infrastructure WLAN
- Providing security in an enterprise environment.

8. Wireless MANs.

- Cellular, Voice and Data Networks
- Cellular networks
- Functioning of AMPs CDPD, GSM GPRS and CDMA based systems.

9. ***Wireless WAN***

- Wireless Internet
- WAP and its use in wireless internet.
- Introduction to WML
- Brief introduction to J2ME

Learning Outcomes

On completing this course the student should be able to:

- Understand different types of wireless local area network (WLAN) technologies.
- Understand the significance that specific layers the TCP/IP protocol have in wireless communications.
- Identify the different types of wireless communications protocols contained in the IEEE 802.11 WLAN standard.
- Identify the most critical antenna design parameters and understand their impact in wireless communications.
- Understand radio frequency (RF) propagation.
- Understand spread spectrum technology.
- Demonstrate the ability to design and implement a wireless data collection system.
- Demonstrate the ability to communicate and document technical information in a professional, structured, timely, and effective manner.

Recommended and Reference Books

[1] William Stallings, 2005, Wireless Communications and Networks, 2nd Edition, Pearson Prentice Hall

[2] Jorge Olenewa, Mark Ciampa, Wireless# *Guide to Wireless Communications*, 2nd Edition, Thompson Course Technology. ISBN-13 978-1-4188-3699-3

[3] William Stallings, 2004, *Data & Computer Communications*, 7th Edition, Prentice Hall

[4] William C. Lee, 2005, *Wireless and Cellular Telecommunications*, 3rd edition, McGraw Hill

[5] Fred Halsall, 2005, *Computer Networking and the Internet*, Addison Wesley

[6] T.S. Rappaport, 2002, *Wireless Communications: Principles &* Practice, 2nd Edition, Prentice Hall

[7] W.C.Y. Lee, 1998, *Mobile Communication Engineering*, Theory and

Applications", 2nd Edition, McGraw-Hill
[8] Fred Halsall, 2001, *Multimedia Communications, Applications, Networks, Protocols and Standards*, Addison Wesley