

Graduate Program in Telecommunications  
George Mason University

## **TCOM 500: Modern Telecommunication Fall 2019**

**Instructor: Dr. Asha Mehrotra**

**Instructor: Asha Mehrotra** Ph.D.  
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**Time and Place** Wednesday 4:30 - 7:10 PM, Room No: To be announced

**Teaching Assistant:**  
Email: xxx@GMU.edu  
Office hours: TBD

### **Course Description**

This course provides an in-depth introduction to various physical layer aspects of modern Telecommunications systems. Topics include Protocol, Data Encoding, Selected part of Transmission Media, Error Coding, Queuing, Flow Control, and Selected section on Cryptography and Network Security

### **Course Objectives**

By the end of the course, students should be able to:

- Understand the fundamentals of Data Transmission, Protocol, and Signal Encoding.
- Understand the characteristics of different transmission media.
- Understand the basic concepts of Digital Modulation, Error Detection Schemes, Wireless Systems, and Flow Control schemes.
- This course will prepare students to take advance Courses in Coding, Modulation, Applications of Digital Data Transmission

**Distance learning section** is offered synchronously via the web using Blackboard Collaborate software. Collaborate student instructions and guidelines for proctored tests are posted on the Blackboard.

### **Textbook**

*Data Communications and Networking*, Behrouz A. Forouzan, McGraw- Hill, 5th Edition, 2012.

### **Course Material**

All course materials, including the syllabus, lecture slides and homework assignments will be posted on the Blackboard

{<http://mymason.gmu.edu>}. Login using your GMU email ID and password.

**Homework** will be assigned weekly and is due the following week. Late homework will be Penalized by 10%.

**Grading: Homework 20%, Midterm 30%, Final 50%**

## Tentative Course Outline

**Week 1(28/08/2019):** Functional Requirements of Protocol: Protocol needs, Functions of layered software between two Computers. Brief summary of course (What will you learn from this course and why this is the starter course for Telecom Degree

**Week 2(04/09/2019):** Chapters 1 & 2, Overall requirements of Data Communication

**Week 3(11/09/2019):** Chapters 3: Digital Signals, Transmission Impairments, and Channel Capacity, Noise and Distortions, data rate limits, Performance; Line Coding

**Week 4 (18/09/2019):** Chapter 4: A/D Conversion, Delta Modulation and Modes of Transmission

**Week 5(25/09/2019):** Chapter 5: Digital Modulation

**Week 6(02/10/2019);** Chapter 6: Multiplexing and Spectrum Spreading: FDM, TDM, and WDM Schemes, Spread Spectrum System

**Week 7(09/10/2019):** Mid-term Examination. Covers from week 1 to week 6

**Week 8(16/10/2019):** Chapter 8: Circuit and Packet Switching

**Week 9:(23/10/2019):** Selected Sections of Chapter 7 on transmission media; Fiber-Optic cable, Wireless media, Antenna and Space-Loss concept

**Week 10:(30/10/2019):** Error Detection and Correction

**Week 11:(06/11/2019):** Wired Network: Telephone, Cable and Signaling Networks. SONET architecture and multiplexing

**Week 12:(13/11/2019):** WiMAX, Cellular: 1G, 2G, and 3G Networks. CDMA (IS95 and CDMA 2000 networks). Satellite Networks: LEO, GEO, and MEO systems, Orbit details

**Week 13:(20/11/2019);** Left-over of various topics; Selected sections of Cryptography and Network Security

**Week 14:(04/12/2019);** Chapter 30 (Higher Layer Function): Quality of Service, Flow Control, Integrated and Differentiated services

**Week 15:(11/12/2019);** Final Examination

Grading: HW 20%, Midterm 30% and Final 50%