



# MARYLAND APPLIED GRADUATE ENGINEERING

## **DATA NETWORKS (ENPM 602)**

**Term:** *Spring 2023*

**Professor:** C. Ravishankar

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**Office Hours:** Mondays 9:45 PM to 10:30 PM

**Credits:** 3

**Course Dates:** From Jan 1, 2023 - May 1, 2023

**Course Times:** 7 PM to 9:40 PM

**Classroom:** JMP 2217

**Prerequisites :** ENEE324; or students who have taken courses with comparable content may contact the department

### **Course Description**

Students will learn principles of network design, including physical layer, MAC layer, data link layer, network layer and transport layer. Given the recent advancements in 5G wireless technologies and beyond, the course also covers wireless protocols. Course covers error detection and correction schemes, CSMA/CD and slotted-ALOHA schemes, ARQ schemes, Quality of Service, Markov chains and queuing models for delay analysis; IP addressing, routing algorithms and protocols, TCP/UDP, Mobile IP and IP Multicast.

### **Learning Outcomes**

After successfully completing this course you will be able to:

- Understand the factors affecting data network design at various layers
- Apply the knowledge to conduct end-to-end system design
- Analyze network performance in terms of delay, packet loss and blocking probability
- Understand terrestrial wireless operation including 5G
- Select design parameters to allow efficient operation over short and long delay links

### **Required Resources**

Communication Networks by A. Leon-Garcia and I. Widjaja, Second Edition, 2004

### **Course Outline**

- Layered Protocol Architectures - OSI Model
- Digital Transmission Fundamentals
- Error Detection and Correction
- Link Layer Protocols - ARQ methods
- IEEE LAN and MAC Protocols
- Packet Switching Protocols
- Routing Algorithms
- Markov Chains and Queueing Models
- TCP/IP

- Quality of Service (QoS) handling in data networks
- Wireless Data Networks - GPRS (2.5G), 3G, 4G, 5G and Wireless LAN
- Mobile IP and IP Multicast

## Grading Structure

Assignment	Percentage %
Course Project	15%
Mid-Term Exam	35%
Final Exam	50%
<b>Total</b>	<b>100%</b>