

Carleton University

Department of Systems and Computer Engineering
Network Access Techniques

SYSC5403

Fall 2011

Course Information

Instructor:

Professor Roshdy H.M. Hafez

Room 4440 ME, Tel: 520-5731, email: hafez@sce.carleton.ca

Office Hours:

TBD

Course Description and Objective:

This course covers a variety of network access techniques and technologies. The course treats the subject at the physical layer level; therefore, it is limited to students with adequate background in spectral analysis, digital communications, coding and communication theory. Among the access techniques discussed in the course are: high speed transmission over twisted pair loops, transmission over coaxial cable, wireless access, direct broadcast satellite and fiber in the loop. The course covers some basic modulation and coding techniques used in modern networks. OFDM and CDMA are discussed and analyzed.

Prerequisites:

SYSC 5503 or ELG6153 (Stochastic Processes)

SYSC 5504 or ELG5375 (Principles of Digital Communications)

Students who do not hold the prerequisites should get the permission of the department.

Text:

There is no required text for this course.

Recommended References:

(1) L. Goleniewski and K. W. Jarret, "Telecommunications Essentials: The complete global source", 2/E, Addison-Wesley Professional, 2007.

(2) E.B. Carne, "Telecommunications Primer", 2nd ed., Feher/Prentice Hall, 1999

Grading Scheme:

Term paper 15%

In-Class Mini-Exams 15%

Final Examination 70%

Exam Policy:

The final exam is for evaluation purposes only and will not be returned to the students nor will students be allowed to see their final exam once submitted.

Attendance:

Class attendance is *strongly recommended*. If a class is missed, a student should make arrangements to get notes from other students. The importance of regular class attendance and good note taking cannot be understated.

Academic Honesty:

All instructional offences will be handled by referring the case directly to the Dean for penalties.

Students with disabilities:

Students with disabilities requiring academic accommodations in this course are encouraged to contact a coordinator at the Paul Mention Center for Students with Disabilities to complete the necessary *letters of accommodation*. After registering with the PMC, make an appointment to meet and discuss your needs with me at least two weeks prior to the first in-class test. This is necessary in order to ensure sufficient time to make the necessary arrangements. Paul Mention Centre: 520-6608. <http://www.carleton.ca/pmc/>

Introduction: (1 week)

Overview of communication networks
The journey from PSTN to LTE
Some basic networking techniques
Access vs. Core technologies

Access over Twisted Pair Wires: (1 weeks)

Noise characteristics and frequency distortion of TP
Multi-tone modulation
Basic CAP and DMT
ADSL/HDSL/RADSL/SDSL and VDSL
The ADSL standard

Cellular Wireless Access: (3 weeks)

GSM and GPRS
CDMA and WCDMA
HSPA

Broadband Wireless Access: (3 weeks)

Broadband services
Broadband wireless access
OFDMA analysis and performance
WiMax and LTE

Local Area Networks: (2 week)

Transmission over Ethernets
10 Mbps and 100 Mbps access
Wireless LAN's
WiFi and ad-hoc access technologies
Multi-Hop
Mesh networking

Access over Cable TV: (1 weeks)

Structure of CATV
CATV noise model
2-way-CATV
Forward distribution channels
Reverse TDMA access return channel

Review: (1 weeks)