

SAULT COLLEGE OF APPLIED ARTS & TECHNOLOGY
SAULT STE. MARIE, ONTARIO

COURSE OUTLINE

Course Title: DATA COMMUNICATIONS

Code No.: CET 222

Program: COMPUTER ENGINEERING TECHNOLOGY

Semester: FOUR

Date: JANUARY, 1986

Author: TYCHO BLACK

New: _____ Revision: X

APPROVED: _____
Chairperson Date

CALENDAR DESCRIPTION

DATA COMMUNICATIONS
Course name

CET 222
Course Number

PHILOSOPHY/GOALS:

This course addresses the needs of the computer engineering technologist to be well versed in both the practical and theoretical aspects of Data Communications. Asynchronous and synchronous communications, interface standards, protocols, modems, telephone system fundamentals, local area networks and computer network concepts are studied with many areas reinforced with practical lab activities.

METHOD OF ASSESSMENT:

3 WRITTEN TESTS	75%
LAB REPORTS AND QUIZZES	25%

Some minor changes to the method of assessment may be necessary.

Unauthorized absence from lab periods and lateness in handing in reports will result in penalties.

No re-write option will be granted to students with an overall grade of less than 40% or failing grades on all 3 theory tests.

TEXTBOOK :

"DATA COMMUNICATIONS: A USER'S GUIDE"
by Ken Sherman (Reston, 2nd Edition)

SPECIFIC OBJECTIVES: DATA COMMUNICATIONS

- REFERENCES: 1. "DATA COMMUNICATIONS: A USER'S GUIDE"
by Ken Sherman
2. Instructor's notes.

BLOCK 1: INTRODUCTORY CONCEPTS

PART A INTRODUCTION

1. Background of Data Communications. (Chap.1)
2. Canadian Telecommunications Services
3. Standards Organizations.

PART B ASYNCHRONOUS COMMUNICATIONS

1. The nature of asynchronous communications.
2. The M6850 Asynchronous Communications Interface Adapter (ACIA) as an example of a single line asynchronous interface. Its internal registers and programming requirements will also be studied.

PART C MEDIA AND THE TELEPHONE SYSTEM (Chap.3 and 4)

1. An overview of communications media.
2. Introduction to the telephone system.
3. Analogue vs. Digital transmission.
4. Frequency Division Multiplexing vs. Time Division Multiplexing (Chap. 12).
5. Circuit Types (Chap. 4). Point-to-point and multipoint lines; half duplex and full duplex communication.

PART D INTERFACE STANDARDS (Chap. 6)

1. 20 ma current loop.
2. EIA RS-232-C (V.24/V.28)
Electrical signal characteristics and functional description of the interchange circuits.
3. EIA RS-449 (RS-422/RS-423)
4. UPI (Universal Physical Interface)
5. RS-366 ACU Automatic Calling Unit.

BLOCK 2 SYNCHRONOUS COMMUNICATIONS**PART A SYNCHRONOUS COMMUNICATIONS (Chap.7)**

1. The nature of synchronous transmission.
2. The DUV11 Single Line Synchronous Interface for the PDP-11 computer will be studied including internal registers and programming requirements.

PART B PROTOCOLS (Chap. 8 and Class notes)

1. Eight requirements of synchronous protocols.
2. Three examples of protocols:
 - a) Bisync: a half-duplex character-oriented IBM protocol. This will include a study of code sets and the use of control codes. (Chap. 5)
 - b) SDLC (Synchronous Data Link Control) IBM's full-duplex bit-oriented protocol.
 - c) DDCMP (Digital Data Communications Message Protocol) DEC's byte-count oriented protocol.
3. ARQ Half-duplex Protocols. (Chap.8)
4. Dial-up and dedicated handshaking.
5. Protocols vs. Circuit types.
6. Protocol converters.

PART C ERROR DETECTION, CORRECTION AND ENCRYPTION (Chap 9)

1. Error checking and correction.
2. Data compression
3. Data encryption

BLOCK 3 MODEMS AND NETWORK HARDWARE**PART A MODEMS AND MODULATION (Chap. 10)**

1. Distance vs. Transmission Rate considerations.
2. Digital Signal types.
3. Analog modulation: AM, FM (FSK), PM (PSK).
4. Multibit modulation techniques (PSK, QAM).
5. Modem types and characteristics will be studied including Bell 103, 202, 212, 201, 208, 209-type modems.
6. Modem-related equipment
 - a) Acoustic couplers
 - b) Autobaud modems
 - c) Automatic equalization
 - d) Null modems
 - e) Echo suppressors.

BLOCK 3 (continued)

PART B NETWORK HARDWARE (Chap 12 and 13)

1. Statistical Multiplexers
2. T-1 Multiplexers
3. Concentrators
4. Message switches
5. Front-end processors and Communications controllers.
6. PABX and PACX
7. Personal computer interfaces and communications software

PART C NETWORK TYPES (Chap. 14 and Class Notes)

1. Packet Switching, using Datapac as an example.
2. Local Area Networks (LANs)
 - a) LAN characteristics and topologies.
 - b) Ethernet LAN characteristics and technical specs
 - c) Baseband/Broadband alternatives
 - d) Other LANs.
3. An overview of satellite systems.

PART D TRANSMISSION BANDWIDTHS AND IMPAIRMENTS (Chap. 15)

1. Transmission impairments
2. Error rates and their measurements
3. Line conditioning
4. Analog and digital signal impairments.

PART E DATA COMMUNICATION SYSTEM TRANSACTION TYPES

1. Inquiry/Response
2. Record update
3. Data entry
4. Data collection
5. Message switching
6. Process control
7. Command and control
8. Batch
9. Diagnostics

BLOCK 4 NETWORK ARCHITECTURE

1. Open Systems Interconnection (OSI)
ISO OSI 7-layer model for computer networks
2. Introduction to DECnet and Digital Network Architecture

EVALUATION PROCEDURES

COURSE:

1. TESTS

Written tests will be conducted as deemed necessary but will usually be announced about one week in advance. Quizzes may be conducted without advance notice.

2. The following grading scheme will be used:

A	80-100
B	66-79
C	55-65
X	
R	Repeat

3. Upgrading of Incompletes:

The method of upgrading is completely at the discretion of the teacher and may consist of one or more of the following options; assigned make-up work, completing or repeating lab activities or assignments, the re-writing of block tests, the writing of a comprehensive supplemental exam. With the absence of a formal make-up period at the end of the semester, it is very difficult to meet individual student needs for remedial work and therefore it is now especially important to not count on a make-up period as a second chance to succeed, because success at this point demands a firm commitment to learning.

Where a student's overall performance has been consistently unsatisfactory, an R grade may be assigned without the option of make-up work.

Attendance and assignment completion may have a bearing on whether make-up work to upgrade an X grade will be allowed.

The highest grade obtainable on a re-write test is 55%.

The following grade symbols have been approved for use in recording grades for the academic year for all post-secondary and non-semestered students.

- "A" - outstanding achievement
- "B" - consistently above average achievement
- "C" - satisfactory or acceptable achievement in areas subject to assessment
- "I" - Incomplete - course work not completed by mid-term assessment but expected to be complete by semester end.
NOTE: the "I" grade is acceptable at mid-term only. It is NOT an approved grade for end of term reporting and will not be recorded at the end of a semester.
- "R" - Repeat - the student has not achieved the objectives of the course and the course must be repeated.
- "X" - a temporary grade that is limited in use to rare instances when no other grade will ensure justice. The "X" grade may not be assigned unless accompanied by a written authorization from the Department Chairman. Time allowed for completing course requirements will not exceed 120 calendar days beyond the end of the semester in which it is assigned, and should only be used at the end of a term. If the final grade for the course is not received in the Admissions & Academic Records Office by the date indicated on the authorization, the "X" will revert to an "R".