

SAULT COLLEGE OF APPLIED ARTS & TECHNOLOGY
SAULT STE MARIE, ON



COURSE OUTLINE

Course Title: INTRODUCTION TO TELECOMMUNICATIONS

Code No.: CSN200 Semester: 3

Program: Computer Engineering Technician,
Computer Network Technician,
Computer System Support Technician,
Computer Programmer.

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Date: August, 1999 Previous Outline Date: June, 1998

Approved: _____
Dean Date

Total Credits: 4 Prerequisite(s): None

Length of Course: 16 Weeks Total Credit Hours: 64

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I. COURSE DESCRIPTION:

This course introduces students to modern telecommunications and data communications including concepts, standards, techniques, applications and devices involved in interconnecting computers and transmitting information, with lab activities supporting the theory. Typical lab activities include use of Modems, Video-Conferencing, Internet applications, HTML and Web publishing.

II. LEARNING OUTCOMES AND ELEMENTS OF THE PERFORMANCE:

Upon successful completion of this course the student will demonstrate the ability to:

A. Learning Outcomes.

1. Compare telecommunications past, present and future, standardization process and the OSI 7-layer model of communication system.
2. Identify the Application Layer, the Internet and its applications. Use the Internet for effective information retrieval, research and communication in support of a technologist's role.
3. Use the Internet for effective information delivery and communication in support of a technologist's role.
4. Simulate the OSI model of Network specifically the Network layer.
5. Describe Data Link Layer of the OSI Model and Error Detection.
6. Relate Communications Basics to different transmission systems.
7. Compare Analog and Digital Transmission.
8. Configure different Modems.
9. Compare different transmission media, Multiplexing - Physical layer.
10. Describe Telephone System and Switching.
11. Configure Video Transmission equipment.

B. Learning Outcomes and Elements of the Performance:

Upon successful completion of this course the student will demonstrate the ability to:

1. Compare telecommunications past, present and future, standardization process and the OSI 7-layer model of communication system.

Potential Elements of the Performance:

- Relate past, present and emerging uses of Telecommunications and as it includes Data Communications.
- Describe basic communications concepts including: half-duplex versus full-duplex, serial versus parallel, point to point versus multidrop.
- Relate the standardization process and the important data communications standards organizations.
- Justify the need of Protocols and Interoperability.
- Describe the ISO OSI 7-layer model of communication systems.

2. Identify the Application Layer, the Internet and its applications. Use the Internet for effective information retrieval, research and communication in support of a technologist's role.

Potential Elements of the Performance:

- Compare application layer protocols, HTTP, FTP.
- Describe the nature of the Internet and the various services it can provide.
- Use the services of the Internet for specified information retrieval tasks.
- Use Internet Applications and tools, FTP, Telnet, Web browser, Search engines, ping, finger, etc.
- Utilize and use Groupware software, Listservs, Usenet newsgroups, Video conferencing.
- Describe electronic commerce.

3. Use the Internet for effective information delivery and communication in support of a technologist's role.

Potential Elements of the Performance:

- Utilize the World Wide Web and HTML to access and display information.
- Compare physical versus logical markup language, HTML.
- Design and hosting simple but effective Web pages containing Communication Topics.
- Utilize URIs and making different links on the Web page.
- Host the Web page to the appropriate server on the Intranet and Internet.

4. Simulate the OSI model of Network emphasizing the Network layer.

Potential Elements of the Performance:

- Compare Network protocols, TCP/IP and others.
- Simulate network addressing, routing and packetizing.
- Describe Internet accessing on the same subnet from known addresses.
- Describe Internet accessing on different subnet from known addresses.
- Describe Internet accessing from unknown addresses.

5. Describe Data Link Layer of the OSI Model and Error Detection.

Potential Elements of the Performance:

- Describe the functions of a Data Link Protocol.
- Describe error detection and correction techniques and the standards associated with them.
- Use various PC file transfer protocols such as Kermit, XModem and ZModem to transfer files and compare their efficiency.
- Utilize various flow control, error control and sequencing techniques used in file transfer and data link protocols.

6. Relate Communications Basics to different transmission systems.

Potential Elements of the Performance:

- Describe the following:
 - Transducers, Telephone Transmitter/Receiver,
 - Signal, in Time and Frequency domain,
 - Filters, Low-pass, High-pass, Band-pass and Band-rejection,
 - Bandwidth,
 - Digital Signals,
 - Fourier Theorem,
 - Modulation (Analog/Digital),
 - Noise,
 - Signal power, signal to noise ratio, Decibel,

7. Compare Analog and Digital Transmission.

Potential Elements of the Performance:

- Describe encoding.
- Compare Parallel versus Serial transmission.
- Compare different transmission modes, half-duplex vs. full-duplex.
- Compare Asynchronous versus Synchronous transmission.
- Communicate by asynchronous transmission between two PCs using serial port.

- Describe UART, RS232 standard.
- Identify RS232 cable (Modem cable) and Null-Modem cable.
- Describe different transmission impairments.

8. Configure different Modems.

Potential Elements of the Performance:

- Describe the need of a Modem.
- Compare QAM, TCM.
- Utilize Shannon's Theorem.
- Compare Modem standards and compression standards.
- Describe A/D conversion.
- Describe digital communications, its advantages, A/D conversion, the sampling theorem, digital coding schemes and Pulse Code Modulation (PCM).
- Describe Sampling, Nyquist Theorem.
- Describe Pulse Code Modulation.
- Install 56k Modem.
- Describe ADSL Modem.

9. Compare different transmission media, Multiplexing - Physical layer.

Potential Elements of the Performance:

- Compare various communications media, cabling standards and their characteristics including: twisted-wire pairs, coaxial cable, microwave radio, satellite links and fibre-optic cable.
- Identify the characteristics of physical layer interface standards.
- Describe Multiplexing, FDM, and TDM.
- Compare T1 and T3 circuits.

10. Describe Telephone System and Switching.

Potential Elements of the Performance:

- Describe the telecommunications systems, the nature of telephone lines, circuits and switches.
- Compare various wide area networking alternatives including switched and dedicated circuits, packet switched services, frame relay and ATM.
- Describe the use of various multiplexing techniques used to enable the efficient use of telecommunications equipment.

11. Configure Video Transmission equipment.

Potential Elements of the Performance:

- Convert images to video signal.
- Relate Frames, Vertical Refresh Rate, and Horizontal Rate to Bandwidth.
- TV transmission.
- Describe Digitized video signal, bandwidth, and transmission.
- Transmit video through telephone lines.
- Compare different video compression standards.

III. TOPICS:

1. Fundamental Data Communications Concepts and Terminology.
2. Network Applications including the use of the Internet.
3. The Telecommunications Systems.
4. Data Communication Hardware and Software.

IV. REQUIRED RESOURCES / TEXTS / MATERIALS:

1. Text Book:
 - Business Data Communications and Networking, 6th edition, by- Jerry Fitzgerald and Alan Dennis, John Wiley and Sons, 1998.
2. Recommended Supplementary Reading:
 - Computer Networks, 3rd edition, by- Andrew S. Tanenbaum, Prentice Hall, 1996.
 - Business Data Communications, 3rd edition, by- William Stallings and Richard Van Slyke, Prentice Hall, 1998.
 - Business Data Communications and Networking, 2nd Edition, by- Raymond Panko, Prentice Hall, 1997.
 - Telecommunications, 3rd edition, by- Warren Hioki, Prentice Hall, 1998.
 - HTML 4.0 Source Book, by- Ian S. Graham, John Wiley and Sons, 1998.

V. EVALUATION PROCESS / GRADING SYSTEM:

3 Theory tests (20% each)	60%
Lab work, Quizzes and Assignments	40%

(The percentages shown above may have to be adjusted to accurately evaluate student skills. Students will be notified of any changes made.)

To pass this course minimum **80% attendance** requires in labs and lectures.

Grading Scheme:

A+	90 - 100%
A	80 - 89%
B	70 - 79%
C	60 - 69%
R	Repeat
X	Incomplete

Note:

It is required to pass both the theory and the lab part of this course. It is not possible to pass the course if a student has a failing average in the three written tests but is passing the lab portion (or vice versa).

Upgrading of Incompletes:

When a student's course work is incomplete or final grade is below 60%, there is the possibility of upgrading to a pass when a student meets all of the following criteria:

1. The student's attendance has been satisfactory.
2. An overall average of at least 50% has been achieved.
3. The student has not had a failing grade in all of the theory tests taken.
4. The student has made reasonable efforts to participate in class and complete assignments.

The nature of the upgrading requirements will be determined by the instructor and may involve one or more of the following: completion of existing labs and assignments, completion of additional assignments, re-testing on individual parts of the course or a comprehensive test on the entire course.

Labs:

Lab activities represent a very important component of this course in which practical 'hands-on' skills will be developed. Because of this, attendance is mandatory and the satisfactory completion of all lab activities is required. Evaluation of lab work in-class will be done. It is the student's responsibility to discuss absences from regularly scheduled labs with the instructor so that alternate arrangements (where possible) can be made to complete the lab requirements.

Lab Reports:

Lab report requirements will be detailed for each lab individually.

Attendance:

Attendance is mandatory. Absenteeism will affect a student's ability to succeed in this course. Absences due to medical or other unavoidable circumstances should be discussed with the instructor, so that remedial activities can be scheduled. Absenteeism for tests can only be allowed for medical reasons and should be authorized ahead of time. Unauthorized absences could result in a zero grade being assigned.

VI. SPECIAL NOTES:

1. Special Needs

If you are a student with special needs (e.g. physical limitations, visual impairments, hearing impairments, learning disabilities), you are encouraged to discuss required accommodations with the instructor and/or contact the Special Needs Office, Room E1204, Ext. 493, 717, 491 so that support services can be arranged for you.

2. Retention of Course Outlines

It is the responsibility of the student to retain all course outlines for possible future use in acquiring advanced standing at other post-secondary institutions.

3. In order to pass this course the student must obtain an overall test average of 60% or better, as well as, an overall assignment average of 60%.
4. Assignments must be submitted by the due date according to the specifications of the instructor. Late assignments will normally be given a mark of zero. Late assignments will only be marked at the discretion of the instructor in cases where there were extenuating circumstances. Attendance in the lectures and labs is mandatory.
5. The instructor reserves the right to modify the assessment process to meet any changing needs of the class. Consultation with the class will be done prior to any changes.
6. The method of upgrading an incomplete grade is at the discretion of the instructor, and may consist of such things as make-up work, rewriting tests, and comprehensive examinations.
7. Your instructor reserves the right to modify the course as he/she deems necessary to meet the needs of students.

VII. PRIOR LEARNING ASSESSMENT

Students who wish to apply for advanced credit in the course should consult the instructor.