

SAULT COLLEGE OF APPLIED ARTS AND TECHNOLOGY

SAULT STE. MARIE, ONTARIO



Sault College

COURSE OUTLINE

COURSE TITLE: **Introduction to Telecommunications**

CODE NO. : **CSN200** SEMESTER: **2**

PROGRAM: **All Computer Studies Programs**

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DATE: **Jan, 2001** PREVIOUS OUTLINE DATED: **Jan, 2000**

APPROVED:

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	DEAN	DATE

TOTAL CREDITS: **4**

PREREQUISITE(S): **None**

HOURS/WEEK: **4**

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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. A LEARNING OUTCOMES:

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.
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. Describe Network Layer of the OSI Model.
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.

II. 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. Describe Network Layer of the OSI Model.

Potential Elements of the Performance:

- Compare Network protocols, TCP/IP and others.
- 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:**

- The primary resource will be the Internet and instructor supplied notes.

2. Recommended Supplementary Reading:

- Business Data Communications and Networking, 6th edition, by- Jerry Fitzgerald and Alan Dennis, John Wiley and Sons, 1998.
- 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, 4th 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:

The mark for this course will be arrived at as follows:

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.)	
Total	100%

80% attendance required in the labs and lectures.

ELIGIBILITY FOR X GRADES/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:

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

Note: **The opportunity for an X grade is usually reserved for those with extenuating circumstances.** 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.

ASSIGNMENTS:

Required format for lab assignments will be detailed by the instructor before labs are assigned.

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. There will be an attendance factor included in the lab evaluation.

The following semester grades will be assigned to students in post-secondary courses:

<u>Grade</u>	<u>Definition</u>	<u>Grade Point Equivalent</u>
A+	90 - 100%	4.00
A	80 - 89%	3.75
B	70 - 79%	3.00
C	60 - 69%	2.00
R (Repeat)	59% or below	0.00
CR (Credit)	Credit for diploma requirements has been awarded.	
S	Satisfactory achievement in field placement or non-graded subject areas.	
U	Unsatisfactory achievement in field placement or non-graded subject areas.	
X	A temporary grade. This is used in limited situations with extenuating circumstances giving a student additional time to complete the requirements for a course (see <i>Policies & Procedures Manual – Deferred Grades and Make-up</i>).	
NR	Grade not reported to Registrar's office. This is used to facilitate transcript preparation when, for extenuating circumstances, it has not been possible for the faculty member to report grades.	

VI. SPECIAL NOTES:**Special Needs:**

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

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.

Plagiarism:

Students should refer to the definition of “academic dishonesty” in *Student Rights and Responsibilities*. Students who engage in “academic dishonesty” will receive an automatic failure for that submission and/or such other penalty, up to and including expulsion from the course/program, as may be decided by the professor/dean. In order to protect students from inadvertent plagiarism, to protect the copyright of the material referenced, and to credit the author of the material, it is the policy of the department to employ a documentation format for referencing source material.

Course outline amendments:

The Professor reserves the right to change the information contained in this course outline depending on the needs of the learner and the availability of resources.

Substitute course information is available in the Registrar's office.

VII. PRIOR LEARNING ASSESSMENT:

Students who wish to apply for advanced credit in the course should consult the professor. Credit for prior learning will be given upon successful completion of a challenge exam or portfolio.

VIII. DIRECT CREDIT TRANSFERS:

Students who wish to apply for direct credit transfer (advanced standing) should obtain a direct credit transfer form from the Dean's secretary. Students will be required to provide a transcript and course outline related to the course in question.