

SAULT COLLEGE OF APPLIED ARTS AND TECHNOLOGY

SAULT STE. MARIE, ONTARIO



Sault College

COURSE OUTLINE

COURSE TITLE: Digital & Data Communications

CODE NO. : ELN-305

SEMESTER: 6

PROGRAM: Electronic Technologist

AUTHOR: Peter Szilagyi

DATE: January
2002

PREVIOUS OUTLINE DATED: January
2001

APPROVED:

DEAN

DATE

TOTAL CREDITS: 6

PREREQUISITE(S): ELN-245 Wireless Systems

**LENGTH OF
COURSE:**

16 weeks

TOTAL CREDIT HOURS: 96

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For additional information, please contact K. DeRosario, Dean
School of Technology, Engineering & Technical Trades
(705) 759-2554, Ext.642

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- I. COURSE DESCRIPTION:** This course is the continuation of **ELN-245**, which is a prerequisite. Analog Pulse Modulation, Modem theory and Digital Modulation will be treated in fair detail. The dial-up telephone system will be presented and explained. Specific VLSI integrated circuits used in digital communication will be introduced and examined in the laboratory. The theory in this course is based on Spectrum Analysis, and that topic will be reviewed.

II. LEARNING OUTCOMES AND ELEMENTS OF THE PERFORMANCE:

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

1. Understand Voice and Data Communications systems and procedures, over a band limited analog system.

Potential Elements of the Performance:

- Recall and explain the structure of the Telephone Network.
 - Recall the concepts of Time Division and Frequency Division multiplexing .
 - Familiarity with Data Communications concepts and standards.
2. Explain Pulse and Digital Modulation principles.

Potential Elements of the Performance:

- Be able to interpret the Sampling theorem.
 - Know the principles of Delta Modulation and Pulse Code Modulation
 - Use a numerical method for Fourier Analysis
3. Apply Digital Modulation principles to Time Divisio Multiplexed Telephone Systems

Potential Elements of the Performance:

- Calculate the S/N ratio of a signal encoded by an 8 bit code
- Apply the μ -law to compress voice signals
- Determine the aperture time for telephone codec A-to-D converters.
- Sketch and explain the structure of a 24 channel PCM frame

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4. Understand Information Theory

Potential Elements of the Performance:

- Know the basic unit of measure for information.
- Calculate information capacity and information content for signals and channels
- Analyze RZ, NRZ, AMI and HDB3 line codes for spectral content

III. TOPICS:

1. Voice and Data Communications over Analog Systems
2. Fourier Analysis with numerical methods
3. Pulse and Digital Modulation and Telephone Switching
4. Information Theory

IV. REQUIRED RESOURCES/TEXTS/MATERIALS:

Handouts and course notes will be provided, as well as components for the laboratory experiments.

- V. EVALUATION PROCESS/GRADING SYSTEM:** There will be four theory tests with a weight of 70% of the final grade. The grading of laboratory type objectives will be in two parts: The demonstrated ability to perform a skill function, e.g. use an instrument in a specified role or test a circuit, will be graded "C". Subjective evaluation of lab reports, supporting theory, deportment, housekeeping etc. will be used to modify the skill function grade upward, where applicable. The grading weight will be 30% for the laboratory. Both theory and laboratory work must be passed independently for a passing grade.

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The following semester grades will be assigned to students in postsecondary 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.	
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 been impossible 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 postsecondary institutions.

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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, as may be decided by the professor. 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.

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.

<include any other special notes appropriate to your course>

VII. PRIOR LEARNING ASSESSMENT:

Students who wish to apply for advanced credit in the course should consult the instructor. Credit for prior learning will be given upon successful completion of the following:

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.