

SAULT COLLEGE OF APPLIED ARTS AND TECHNOLOGY

SAULT STE. MARIE, ONTARIO



Sault College

COURSE OUTLINE

COURSE TITLE: Digital Electronics

CODE NO. : ELN -115

SEMESTER: Three

PROGRAM: Electrical / Electronic / Instrumentation Technician

AUTHOR: Edward Sowka

DATE: 09 / 2004

PREVIOUS OUTLINE DATED: 09/2003

APPROVED:

DEAN

DATE

TOTAL CREDITS: 5

PREREQUISITE(S): ELN-109

HOURS/WEEK: 5

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*For additional information, please contact Colin Kirkwood, Dean
School of Technology, Skilled Trades & Natural Resources*

(705) 759-2554, Ext. 688

I. COURSE DESCRIPTION:

This course is a study of modern digital devices and circuits. The student will study Digital Numbering Systems, Boolean Algebra, common Digital Integrated circuits, as well as other pulse shaping / generating circuits. Emphasis will be placed on the analysis and troubleshooting of these devices and circuits, with a small component of design.

II. LEARNING OUTCOMES AND ELEMENTS OF THE PERFORMANCE:

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

1. Understand terminology and characteristics associated with rectangular wave-shapes.

Potential Elements of the Performance:

- Identify and Define Pulse Amplitude, Period, Pulse Width, Pulse Space, Duty Cycle, Rise / Fall Times, Overshoot / Undershoot and Ringing.
- Set-up common test equipment to output and measure the above listed electrical characteristics of rectangular wave-shapes.

2. Understand digital numbering systems.

Potential Elements of the Performance:

- Fluently count in Binary, Octal, Hexadecimal, Binary Coded Decimal up to 100_{10} .
- Convert between Decimal and Binary, Octal, Hexadecimal, Binary Coded Decimal.
- Understand the Gray and ASCII codes.

3. Understand and troubleshoot circuits employing TTL & CMOS Logic Gates

Potential Elements of the Performance:

- Construct and test circuits employing common digital logic functions.

- Analyse and troubleshoot circuits employing digital logic functions using common test equipment (DVM, Oscilloscope, Logic Probe / Logic Pulser).
4. Understand Pulse Generating and Wave-shaping Circuits.

Potential Elements of the Performance:

- Construct and test circuits used in the generation of non-sinusoidal waveforms utilizing the 555 Timer, Integrators, Differentiators and Schmitt Triggers.

III. TOPICS:

1. Rectangular / Pulse Waveshapes
2. Digital Number Systems
3. TTL Logic Devices and Circuits
4. CMOS Logic Devices
5. Pulse Generating / Shaping Circuits

IV. REQUIRED RESOURCES/TEXTS/MATERIALS:

- Text - Digital Systems Principles and Applications by Tocci & Widmer (Canadian Edition) **Note:** 8th or 9th Edition will suffice.
- Motorola Fast and LS TTL Databook or any current LS TTL Databook You can obtain your data book directly from Motorola (Shipping Cost Applies).
- Digital Parts Package - Digital I.C.'s
- 1st Year Parts Package

V. EVALUATION PROCESS/GRADING SYSTEM:

The final grade will be a combination of theory and practical tests.

60% = Theory (Consisting of 2 tests and several quizzes)

40% = Lab Activities (Lab Reports and Practical Tests)

- **See Special Notes Section for further details affecting final grade.**

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%	
B	70 - 79%	3.00
C	60 - 69%	2.00
D	50 – 59%	1.00
F (Fail)	49% and below	0.00
S	Satisfactory achievement in field /clinical placement or non-graded subject area.	
U	Unsatisfactory achievement in field/clinical placement or non-graded subject area.	
X	A temporary grade limited to situations with extenuating circumstances giving a student additional time to complete the requirements for a course.	
NR	Grade not reported to Registrar's office.	
W	Student has withdrawn from the course without academic penalty.	

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.

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.

- Attendance to lab activities is compulsory, unless discussed with the instructor in advance of the absence and the absence is for a medical or family emergency. A **deduction of 2% per Lab missed**, will be imposed on the final lab mark.
- Your attendance to all classes, and your final grade are directly related. A **deduction of 1% per theory hour missed**, will be imposed.
- Any student that is absent for a test, will be required to provide a doctors' note immediately upon returning. Failing to do so will result in a grade of 0% being assigned to the missed test.
- Tests, quizzes and other activities, will not be scheduled on an individual basis, unless it is for a medical or family emergency.
- Disruptions to theory classes, such as lateness, are not acceptable and will be dealt with on an individual basis.

Laboratory Reports shall be subject to the handout given at the start of the semester. All Lab Reports are due at the start of the following weeks Lab Class unless otherwise stipulated by the instructor. A **penalty of 10% per day** will be assessed for late submissions (Weekends included).

All Lab Reports must be submitted in a Duo-Tang cover.

All other required submissions will be assessed a late penalty of **5% per day** (Weekends included).

Theory Tests will not be returned. Students will be given the opportunity to review / correct the test material.

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.