SAULT COLLEGE OF APPLIED ARTS AND TECHNOLOGY

SAULT STE. MARIE, ONTARIO

Sault College

COURSE OUTLINE

COURSE TITLE: Digital Electronics

CODE NO. :   IIM-704   **SEMESTER:**   Level 2

PROGRAM: Industrial Instrumentation Mechanic Apprenticeship

AUTHOR: Edward Sowka

DATE: January 04   **PREVIOUS OUTLINE DATED:**   N/A

APPROVED:

_____   _____
                                        DEAN   **DATE**

TOTAL CREDITS: 5

PREREQUISITE(S):   None

HOURS/WEEK: 4

I.   COURSE DESCRIPTION:

This course is a study of digital devices and circuits. The student will study number systems, logic gates, flip-flops and applications including storage, registers, sequential circuits, counting, decoding and encoding. Practical exercises will be used to complement theoretical concepts.

II.   LEARNING OUTCOMES AND ELEMENTS OF THE PERFORMANCE:

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

1.   Understand, Describe and Convert digital number systems

        Potential Elements of the Performance:

        - Count in Binary, Octal, Hexadecimal and BCD
        - Convert Decimal Numbers to Binary, Octal, Hex and BCD
        - Convert Decimal Numbers from Binary, Octal, Hex and BCD

2.   Understand the operation of basic Digital Logic Gates. AND, OR, NAND, NOR, INVERTER, Exclusive-OR and Exclusive-NOR gates.

        Potential Elements of the Performance:

        - Identify Standard, IEEE and NEMA gate symbols
        - Develop the Truth Table for basic logic gates.
        - State the Boolean Equation for the basic logic gates.
        - Describe the Enable / Inhibit functions of logic gates.
        - Draw a logic circuit from a given Boolean Equation.
        - Develop the Boolean Equation for a given logic circuit.
        - Develop the Truth Table for a given logic circuit.
        - Use Boolean Theorems to simplify logic circuits.
        - Understand NAND/NOR Universality
        - Understand Alternate Gate Symbology

3.   Understand the operation of NAND / NOR Latches, S/C S/R Latches, J/K Flip-Flops, D-Type Flip-Flops and D-Type Latch.

        Potential Elements of the Performance:

        - Describe and verify the operation of various Flip-Flops
        - Develop and analyze timing diagrams implementing Flip-Flops
        - Distinguish Synchronous and Asynchronous operation

4.   Understand digital applications of logic circuits including, counting, storage, registers, sequential circuits, decoding and encoding.

Potential Elements of the Performance:

- Construct and test digital counting circuits.
- Construct and test sequential circuits.
- Construct and test digital display circuits.

5.   Understand the various Logic Families (TTL, CMOS etc.)

Potential Elements of the Performance:

- Describe electrical properties of various digital logic families
- Describe advantages and disadvantages of logic families

III.   TOPICS:

1.   Digital vs. Analog
2.   Digital Number Systems
3.   Logic Gates
4.   Flip-Flops
5.   Logic Circuits and Applications

IV.   REQUIRED RESOURCES/TEXTS/MATERIALS:

Learning materials will be supplied by the instructor.

Student should bring their personal DMM and small hand tools.

V.   EVALUATION PROCESS/GRADING SYSTEM:

The final grade will be a combination of theory tests and quizzes, as well as Lab exercises and practical tests.

2 Theory Tests @ 25% each = 50%
1 Practical Test @ 25%   = 25%
5 Lab Exercises @ 5% each = 25%
TOTAL   = 100%

The following semester grades will be assigned to students in post secondary and other than postsecondary courses:

Grade	Definition	Grade Point Equivalent
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

CR (Credit)   Credit for diploma requirements has been awarded.

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 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.

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.