



**SAULT COLLEGE OF APPLIED ARTS & TECHNOLOGY**  
**SAULT STE. MARIE, ONTARIO**

**COURSE OUTLINE**

**COURSE NAME:** Measurements and Shop Practices  
**CODE NO.:** ELR-114  
**PROGRAM:** Electrical / Electronics Technician  
**SEMESTER:** One  
**DATE:** September 1995  
**PREVIOUS OUTLINE DATED:** September 1994  
**AUTHOR:** Edward Sowka

**NEW:**    **REVISION:**   X  

**APPROVED:** Bill Armstrong Aug 28, 1995  
**CO-ORDINATOR** **DATE**

LP Crozeth 95-08-28  
**DEAN** **DATE**

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**TOTAL CREDIT HOURS:** 34

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**PREREQUISITE(S):** None

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**PHILOSOPHY/GOALS:**

This course will provide the student with a working knowledge of operating principles, characteristics and limitations of common electronic test equipment. It also introduces the student to electronics' shop practices, including safety and the proper use of tools. Approximately 60% of class time will be spent on laboratory exercises to develop hands-on skills.

**STUDENT PERFORMANCE OBJECTIVES:**

UPON SUCCESSFUL COMPLETION OF THIS COURSE, THE STUDENT WILL BE ABLE TO:

1. Accurately identify common electronic components, determine their electrical physical characteristics, recall and draw their schematic symbol.
2. Demonstrate the correct operation of the following test equipment in measuring Voltage, Current and Resistance; Digital Voltmeter  
Analog Volt-Ohm-Milliammeter (VOM)  
DC Power Supply  
Oscilloscope
3. Understand and practice shop safety and the W.H.M.I.S. legislation.
4. Correctly identify and demonstrate the proper use of common tools used in the repair of equipment including hand tools and soldering / desoldering equipment.

**TOPICS TO BE COVERED:**

1. Electronic Component Identification
2. Electronic Test and Measuring Equipment
3. Shop Safety and W.H.M.I.S.
4. Soldering / Desoldering Techniques

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| <u>LEARNING ACTIVITIES</u>  | <u>REQUIRED RESOURCES</u>  |
|---|--|
| <p>1. <u>Electronic Component Identification</u></p> <p>UPON SUCCESSFUL COMPLETION OF THIS BLOCK OF WORK, THE STUDENT WILL BE ABLE TO:</p> <p>1.1 Correctly identify common electronic components and understand their electrical characteristics.</p> <p>1.2 Recall and accurately draw the schematic symbols of these components.</p> <p>1.3 Recall and accurately apply the <u>Resistor Color Code</u>.</p>  | <p>-Text: Electronic Fundamentals, Circuits, Devices and Applications by; FLOYD</p> <p>-Instructor Handouts</p> <p>-Video: Electronic Component Recognition</p> <p>- Lab Activity: Experiments #1 and #2</p> |
| <p>2. <u>Test Equipment and Measurements</u></p> <p>UPON SUCCESSFUL COMPLETION OF THIS BLOCK OF WORK, THE STUDENT WILL BE ABLE TO:</p> <p>2.1 Recall and understand the basic block diagram of a voltmeter, ammeter and Ohmmeter.</p> <p>2.1 Correctly measure Voltage, Current and Resistance in Series, Parallel and Series/Parallel resistive circuits utilizing the following equipment; DVM, VOM and a DC Power Supply.</p> <p>2.3 Define and understand the term "Loading Effect"</p> <p>2.4 Calculate the ideal and actual voltage and current in a resistive circuit.</p> <p>2.5 Interpret voltage and current measurements to determine the degree of loading.</p> | <p>-Instructor Handouts</p> <p>-Manufacturers' equipment manuals</p> <p>-Lab Activities: Experiments #3 to #7</p>  |

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| <u>LEARNING ACTIVITIES</u>   | <u>REQUIRED RESOURCES</u>  |
|--|--|
| <p>3. <u>Electronic Shop Practices</u></p> <p>UPON SUCCESSFUL COMPLETION OF THIS BLOCK OF WORK, THE STUDENT WILL BE ABLE TO:</p> <p>3.1 Understand the implications of W.H.M.I.S.</p> <p>3.2 Identify and safely and correctly use common hand tools used for electronic repair.</p> <p>3.3 Identify and safely and correctly use basic soldering and desoldering equipment to make simple wire connections, cables and to remove / insert components on Printed Circuit Boards (PCB's).</p> | <p>-Instructor Handouts</p> <p>-Videos: Soldering Techniques<br/>W.H.M.I.S. &amp; Safety</p> <p>-Lab Activity: Experiment #8</p> |
| <p>4. <u>Other Electronic Test Equipment</u></p> <p>UPON SUCCESSFUL COMPLETION OF THIS BLOCK OF WORK, THE STUDENT WILL BE ABLE TO:</p> <p>4.1 Recall and understand the block diagram of a basic oscilloscope.</p> <p>4.2 Correctly operate an oscilloscope to measure accurately, amplitude, period and frequency of sinusoidal waveforms.</p> <p>4.3 Correctly operate a function generator.</p>   | <p>-Instructor Handouts</p> <p>-Manufacturers' equipment manuals</p> <p>-Lab Activity: Experiment #9</p>                         |

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**REQUIRED STUDENT RESOURCES:**

- 1 - First Year Electronics Parts Package
- 1 - Toolkit
- 1 - Duotang Cover

Details of the Parts Package and the Toolkit will be outlined by the instructor in the first scheduled class.

**ADDITIONAL RESOURCE MATERIAL:**

Equipment manuals, supplier catalogues and lab exercises will be provided by the instructor or the Technologist as required.

**RESOURCE MATERIAL AVAILABLE IN COLLEGE LIBRARY:**

Electrical Fundamentals by D.A. Bell  
Prentice Hall

Electronic Techniques: Shop Practices and Construction by Robert Vilanucci  
Prentice Hall

Electronic Instruments by Dale R. Patrick  
Prentice Hall

**SPECIAL NOTES:**

1. The instructor reserves the right to modify the course (content and evaluation methods) as is deemed necessary to meet the needs of the students.
2. Students with special needs are encouraged to discuss required accommodations, confidentially, with the instructor. (ie. Physical limitations, Visual/Hearing impairments etc.).
3. Attendance to lab (practical) activities is compulsory, unless discussed with the instructor in advance of the absence. It is a fact that, attendance and your final grade are directly related.

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**METHODS OF EVALUATION:**

1. The grading system is as follows;

- A+ = 90% - 100%
- A = 80% - 89%
- B = 70% - 79%
- C = 55% - 69%
- R = Repeat (Student must repeat the course)
- X = Temporary grade assigned, at the instructors discretion, to a student who has not successfully completed the course because of extenuating circumstances (ie. serious illness etc.). (Refer to Student Handbook)

2. The final grade will be derived as follows;

- 60% - Practical work, labs and tests
- 30% - Theory tests and quizzes
- 10% - Subjective evaluation

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- 100% - Total

3. At least 1 weeks notice will be given for major theory and practical tests. These tests can be purely theoretical, practical or a combination of both.

4. Quizzes may be given without notice to test for short term retention.

5. Each student will be continually, subjectively evaluated by the instructor based on attendance, work habits, participation, ability to work with others, attitude and professional work ethic.