



**I. COURSE DESCRIPTION:**

This is a primarily a lab course designed to allow the students to develop their problem solving, design, organizational and scheduling skills by carrying through to completion several Embedded Microcontroller projects. Each project will have hardware and software components. Source code for software will be written in Assembly Language and/or C language.

**II. LEARNING OUTCOMES AND ELEMENTS OF THE PERFORMANCE:**

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

1. Writing Assembly Language Programs for a Microcontroller  
Potential Elements of the Performance:  
Develop algorithms and write source code in assembly language for an embedded microcontroller. Assemble and debug programs.
2. Writing C Language Programs for a Microcontroller  
Potential Elements of the Performance:  
Develop algorithms and write source code in C language for an embedded microcontroller. Compile and debug programs.
3. Building Interface Circuitry  
Potential Elements of the Performance:  
Design, build and commission hardware interface circuitry for an embedded microcontroller.
4. Testing Completed Project  
Potential Elements of the Performance:  
Test the completed project and debug the problems.

**III. TOPICS:**

The following are sample projects the students may work on:

1. Analog to Digital Conversion and 7 segment display project
2. Key-pad scanning and display project
3. Stepper Motor Control Project.
4. Single and three phase inverters.
5. Single and three phase controlled rectifiers.
6. Voltage and frequency transducers.
7. Data Collection and Trending

**IV. REQUIRED RESOURCES/TEXTS/MATERIALS:**

Hand tools, PPE (safety glasses and hard toed shoes – may be required if projects involve work in electrical labs requiring PPE), protoboard, multimeter.

**V. EVALUATION PROCESS/GRADING SYSTEM:**

Evaluation will be based on the following:

- 35% Project execution (functionality and staying on schedule)
- 35% Project specifications and documentation (Each project must be accompanied by specifications and documentation of sufficient detail to allow others to duplicate the hardware, software and results. Students will be provided with the required format. Failure to follow this format may result in a grade of 0 being assigned.)
- 30% Tests (2 tests equally weighted will each be a combination of theory and practical material).

The following semester grades will be assigned to students:

<b>Grade</b>	<b><u>Definition</u></b>	<i>Grade Point Equivalent</i>
A+	90 – 100%	4.00
A	80 – 89%	3.00
B	70 - 79%	2.00
C	60 - 69%	1.00
D	50 – 59%	0.00
F (Fail)	49% and below	
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:****Attendance:**

Sault College is committed to student success. There is a direct correlation between academic performance and class attendance; therefore, for the benefit of all its constituents, all students are encouraged to attend all of their scheduled learning and evaluation sessions. This implies arriving on time and remaining for the duration of the scheduled session.

**Other (course specific):**

It is acceptable that students consult with each other in relation to their assigned problems. However, it is unacceptable to copy programs written by someone else and submit them as your own work. Where plagiarism or copying is found and it is impossible to determine whose original work it is, a mark of zero will be assigned to all assignments involved.

Attendance to scheduled lab activities is compulsory, unless permission has been granted by the instructor. If a student misses a test/lab he/she must have a valid reason (i.e. medical or family emergency – documentation may be required). In addition, the instructor **must** be notified **prior** to the test or lab sitting. If this procedure is not followed the student will receive a mark of zero on the test/lab with no make-up option.

If a student misses class time due to sickness, family emergency or other reason beyond his/her control the student must at his/her first opportunity meet with the course faculty to discuss if the missed time has placed the student at an increased risk of failing. The student must follow up the meeting by emailing the faculty with a summary of the meeting's discussions. Documentation validating the missed time may be required.

**Use of cell phones/PDAs for any form of communication (voice, text...) during class or lab time is strictly prohibited. Cell phones/PDAs must be silenced during regular class and lab times and must be turned off and kept out of sight during test (and quiz) sittings. Failure to follow the latter requirement during a test sitting will result in a grade of 0 being assigned.**

**Students may not wear earphones of any kind (i.e. for play back of recorded music/voice) during lab activities (where safety is a concern) or test sittings. This does not include hearing aids required for hearing impaired.**

Students are expected to maintain an active Sault College email account. They are required to check this email account daily. The instructor may announce details of lab and test requirements and scheduling through the Sault College email system (as well as sharing other important information).

#### **VII. COURSE OUTLINE ADDENDUM:**

The provisions contained in the addendum located on the portal form part of this course outline.