



**I. COURSE DESCRIPTION:**

This course introduces the student to three phase AC transformers, motors, loads and associated equipment. Lab exercises will provide the students with hands-on experience with typical commercial AC motor control circuit connections.

The student will develop an understanding of the hardware and software associated with the Allen Bradley 5 family PLCs. PLC programming techniques using RS logic 5 software will be used to design, document and commission basic to intermediate PLC lab assignments.

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

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

**1. *Connect, test and analyze single phase and poly phase transformers.*****Potential Elements of the Performance:**

- Describe and demonstrate the operation of single-phase transformer in terms of polarity, impedance and winding ratios.
- Describe and demonstrate the operation of three phase transformers in wye and delta configurations.
- Describe and demonstrate three phase transformer connections for RLC balanced loads.
- Describe and demonstrate single and three phase autotransformers for reduced voltage motor starting

**2. *Connect, test and analyze wound rotor motors*****Potential Elements of the Performance:**

- Identify the mechanical parts, windings and connections for three phase wound rotor induction motors.
- Describe and demonstrate the operation of a three phase wound rotor induction motor and its external control circuits.
- Connect and describe the effects of differing resistances in the rotor circuit of a wound rotor motor under varying loads.

**3. *Connect, test and analyze synchronous and squirrel cage motors*****Potential Elements of the Performance:**

- Describe and demonstrate the operation of synchronous motors in power factor correction and constant speed applications.
- Describe and demonstrate the controller circuit for a two-speed squirrel cage motor.

**III. TOPICS:**

1. Single phase and poly phase transformers.
2. Wound rotor motors.
3. Synchronous motors.
4. Squirrel cage motors.

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

- Notes supplied by instructor
- Hand tools
- Safety Glasses

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

Test 1 (machines)	15 %
Practical Test 1 (machines)	15 %

Lab Write-ups (machines)	20 %
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Total	50 %
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The other 50% for this course is made up of the PLC labs

**While marks are not given for attendance, marks may be deducted for classes missed. See Special Notes section.**

The following semester grades will be assigned to students in apprenticeship courses:

<b>Grade</b>	<b><u>Definition</u></b>	<i>Grade Point Equivalent</i>
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:

### 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.

### 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 institution

### Prior Learning Assessment:

Students who wish to apply for advance credit transfer (advanced standing) should obtain an Application for Advance Credit from the program coordinator (the course coordinator regarding a general education transfer request) or academic assistant. Students will be required to provide an unofficial transcript and course outline related to the course in question. Please refer to the Student Academic Calendar of Events for the deadline date by which application must be received for advance standing.

Credit for prior learning will also be given upon successful completion of a challenge exam or portfolio.

Substitute course information is available in the Registrar's office.

### Disability Services:

If you are a student with a disability (e.g. physical limitations, visual impairment, hearing impairments, or learning disabilities), you are encouraged to discuss required accommodations with your professor and/or the Disability Services office. Visit Room E1101 or call Extension 2703 so that support services can be arranged for you.

### Communication:

The College considers **WebCT/LMS** as the primary channel of communication for each course. Regularly checking this software platform is critical as it will keep you directly connected with faculty and current course information. Success in this course may be directly related to your willingness to take advantage of the **Learning Management System** communication tool.

Plagiarism:

Students should refer to the definition of “academic dishonesty” in *Student Code of Conduct*. A professor/instructor may assign a sanction as defined below, or make recommendations to the Academic Chair for disposition of the matter. The professor/instructor may (i) issue a verbal reprimand, (ii) make an assignment of a lower grade with explanation, (iii) require additional academic assignments and issue a lower grade upon completion to the maximum grade “C”, (iv) make an automatic assignment of a failing grade, (v) recommend to the Chair dismissal from the course with the assignment of a failing grade. 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.

Student Portal:

The Sault College portal allows you to view all your student information in one place. **mysaultcollege** gives you personalized access to online resources seven days a week from your home or school computer. Single log-in access allows you to see your personal and financial information, timetable, grades, records of achievement, unofficial transcript, and outstanding obligations. Announcements, news, the academic calendar of events, class cancellations, your learning management system (LMS), and much more are also accessible through the student portal. Go to <https://my.saultcollege.ca>.

Electronic Devices in the Classroom:

Students who wish to use electronic devices in the classroom will seek permission of the faculty member before proceeding to record instruction. With the exception of issues related to accommodations of disability, the decision to approve or refuse the request is the responsibility of the faculty member. Recorded classroom instruction will be used only for personal use and will not be used for any other purpose. Recorded classroom instruction will be destroyed at the end of the course. To ensure this, the student is required to return all copies of recorded material to the faculty member by the last day of class in the semester. Where the use of an electronic device has been approved, the student agrees that materials recorded are for his/her use only, are not for distribution, and are the sole property of the College.

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.

**IX. LAB REQUIREMENTS:**

1. All lab reports are to be computer generated. Hand written reports will not be accepted.
2. All lab reports are to include a title page with the following information:
  - Lab title and number
  - Due date
  - Course number
  - Names of group members
  - Instructor's name
3. Lab reports are to include all procedures and observations listed in the order they were performed/taken and numbered to match the lab handout.
4. Every lab report is to conclude with a summary (whether requested in the lab document or not). The summary is to be 1 page (double spaced, Arial size 12 font, maximum 1 inch margins) in length and is to be an analysis of the results. The summary is not to be a regurgitation of the results. It is expected that students will use course notes, library resources and Internet research to assist in writing lab summaries. Labs submitted with a substandard summary will receive a grade of 0.
5. One lab report submission per group. Maximum 2 members per group.
6. Lab reports submitted with grammatical and/or spelling errors will receive a grade of 0. Word processors have spell check, it is expected students will use it.
7. Lab reports are due at the beginning of class 1 week after the scheduled period in which it was done. Late submissions will receive a grade of 0 (But are still required to be submitted).
8. Students are not permitted to work on live equipment outside of regular class time. If a student misses all or part of a lab class he/she will not be permitted to submit the corresponding lab report. Contact the instructor for available lab make-up time
9. Students must supply their own hand tools and safety glasses. Students will not be permitted in the lab without safety glasses and must wear the safety glasses whenever working on or around live equipment. Students must never work alone in the lab. Unsafe work habits will not be tolerated.