

I. COURSE DESCRIPTION:

This course introduces the student to electrical installation methods. The Canadian Electrical Code is covered in conjunction with interpretation of construction drawings and specifications for residential installations.

II. LEARNING OUTCOMES AND ELEMENTS OF THE PERFORMANCE:

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

1. Interpret rules of the CEC, which apply to residential installation.**Potential Elements of the Performance:**

- Prepare a layout drawing for a service mast and indicate the procedure for installation (Section 6).
- Determine service entrance sizes, conductors and service disconnecting means. Service calculations for a single family dwelling.
- Complete an electrical system design from the point of utility supply, emergency supplies and transfers, to a panel board.
- Determine branch circuit requirements for supplying electric ranges
- Determine the maximum number of outlets allowed per circuit
- Explain the CEC regulations regarding grounding and bonding (section 10) of electrical systems and circuits operating at 750 volts or less.
- Identify installation requirements for ground fault circuit interrupters, arc fault circuit interrupters, transient voltage surge suppressors and isolated ground receptacles.
- Identify required locations of panel boards in single dwellings
- Identify installation requirements for receptacles installed in single dwelling occupancies as specified in the installation of electrical equipment section 26 of the CEC.

2. Interpret and revise specifications and drawings for a single dwelling construction project.**Potential Elements of the Performance:**

- Use a set of drawings of a single dwelling to apply the information from the architectural, structural and mechanical drawings in relation to an electrical installation.
- Draw and label a panel schematic for a single dwelling.
- Prepare an electrical material take-off for a single dwelling.
- Apply specifications, building and electrical code to single dwellings.
- State procedures for inspecting an installation by the appropriate authority.

3. Prepare and complete layout and installations as applicable to a single dwelling construction project. (Labs)

Potential Elements of the Performance:

- Install a 100 amp service (X3) for 1) underground, 2) stack and 3) mast installations.
- Layout and install receptacles including split receptacles and split switched receptacles.
- Demonstrate wiring of ground fault receptacles, ground fault breakers and arc fault breakers.
- Demonstrate installation methods for non-metallic sheath cable and armoured cable (BX).
- Demonstrate installation of EMT and PVC conduit.

III. TOPICS:

1. CEC, layout and general rules
2. CEC, residential rules
3. Residential electrical installation methods

IV. REQUIRED RESOURCES/TEXTS/MATERIALS:

- Ontario Electrical Safety Code (current edition) or Canadian Electrical Code Part 1 (current edition)
- Electrical Wiring Residential (current edition published by Delmar)
- Hand tools including tester, common screw drivers, diagonal pliers, side cutters, adjustable pliers, hacksaw, claw hammer and tool pouch

V. EVALUATION PROCESS/GRADING SYSTEM

Theory 50% (Quizzes, unit assignments, tests)

Quizzes (may be unannounced) 1% each to a maximum of 10 %.

Completion of unit questions 20%.

Three tests equally weighted total of 20 to 30 %

Lab 50%

Assessment of lab activities, associated reports / assignments 50%

NOTE!: Students must maintain a minimum average of 50% in quizzes and tests in order to pass the course

The following semester grades will be assigned to students:

Grade	<u>Definition</u>	<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.	

If a faculty member determines that a student is at risk of not being successful in their academic pursuits and has exhausted all strategies available to faculty, student contact information may be confidentially provided to Student Services in an effort to offer even more assistance with options for success. Any student wishing to restrict the sharing of such information should make their wishes known to the coordinator or faculty member.

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.

VI. COURSE OUTLINE ADDENDUM:

The provisions contained in the addendum located in D2L and on the portal form part of this course outline.

HMI203 Electrical Installation Methods I – Course Plan

Week	Outcomes	Format	Hours	Topic/Content	Readings	Assignments	Assessment	Resources
1-4	1, 2	Lecture	8	Review Canadian Electrical Code Review Intro. to Residential Electrical installations code (HMI111)	Units 3,4 (services Code sec. 6)	Handout / teacher's resources (for review)	Review quiz Assign. to be handed in	Canadian Electrical Code Book (CEC), Residential Electrical Wiring
				<u>Describe</u>				
				Objective, scope and general arrangement of the Canadian electrical code.				
				<u>Identify</u>				
				Determine service entrance sizes, conductors and service disconnecting means.				
	1,2,3	Lab	8	<u>Apply</u>				
				Prepare a layout drawing for a service mast and indicate the procedure for installation, including underground and stack installations	Code sec. 6	Lab Assignmt #1 and 2	Assign. to be handed in	
5-8	1,2	Lecture	8	<u>Explain</u> Canadian electrical code for residential installation.	Unit 10-11 Pg. 185-211 Section 6	Pg. 194 Ques. 1-9	To be handed in Week 5 review / test	CEC, Residential Electrical Wiring
				Complete and electrical system design from the point of utility supply, emergency supply and transfers to a panel board.	Sect. 26-400 Sect. 6, 8			
				<u>Explain</u>				
				Grounding and bonding.				

				Circuits operating at 750 volts or less (section 10).				
				Branch circuits (review)				
				<u>Identify</u>				
				Determine the maximum number of outlets allowed per circuit.				
				<u>Explain</u>				
				CEC regulations regarding grounding and bonding (Sect. 10) of electrical systems and circuits operating at 750 volts or less.	Sect. 8-304			
				Ground faults circuit interrupters, arc fault circuit interrupters, surge suppressors and isolated ground receptacles.	Sect. 26 Unit 9 Pg. 165-180	Ques. 1-23 Pg. 181	Assign. to be handed in	
				<u>Explain</u>				
				Operation and connection of GFCIs.				
				Why GFCIs are required.				
				Installation of GFCIs and AFCIs				
				<u>Identify</u>				
				Locations of GFCIs and AFCIs.				
				The theory of ground fault.				
	1,2,3	Lab	4	<u>Apply</u>				
				Continue the layout and installation procedure for mast installations	Code sec. 6	Lab Assignmt #3	Assign. to be handed in	
				Calculate conduit fill for same size conduit and insulation type.				
				Calculate conduit fill for different sizes and insulation type.				

				Calculate raceway fill types (section 12)	Ref. Unit 12 Pg. 220-233	Pg. 257 Ques. 1-24	To be handed in	Residential Electrical Wiring
				Calculate raceway fill for different sizes and insulation type (section 12).				
				Calculate number of conductors size 14 to 6 that are permitted in a box.				
				Calculate the minimum size of pull boxes, straight, angled and u-pulls larger than a number 6.				
				Calculate ampacity, factors for single conductors in free air, including conductors in parallel.				
			4	Demonstrate wiring of ground fault receptacles, ground fault breakers and arc fault breakers.		Lab Assignmt #4	To be handed in	
8-9-10	1, 2	Lecture	6	<u>Explain</u> Specifications and drawings	Unit 13 Pg. 237-246. Section 8	Pg. 246 Ques. 1-3, 1-11, 1-8.	To be handed in Week 10 review / test	CEC and Residential Electrical Wiring
				State procedures for inspecting an installation by appropriate authority.				
				Specifications, building and electrical codes (CEC)				
				<u>Identify</u>				
				Alpha-numerical lines.				

	1,2,3	Lab	6	<u>Apply</u>				
				Layout and install receptacles including split receptacles and split switched receptacles		Lab Assignmt #5	To be handed in	
				Competency with metric and Imperial scales.				
				Convert between the two.				
				Residential specifications.				
				Using a set of drawings of a single dwelling, apply information from the architectural, structural and mechanical drawings.				
				Draw and label a panel schematic.				
				Prepare an electrical material take-off.				
11-12	1,2,3	Lecture	4	<u>Explain</u> Special purpose outlets	Unit 15 Pg. 262-271	Pg. 271 Ques. 1-10, 1-8, 1-8, 1-10	To be handed in	CEC, Residential Electrical Wiring
				<u>Identify</u>				
				Electrical plans and special installations.				
				Infinite heat temperature controls.				
				How to install a feeder and divide a feeder into individual circuits.				
	1,2,3	Lab	4	<u>Apply</u> Demonstrate installation methods for non-metallic sheath cable and armoured cable (BX)		Lab Assignmt #6	To be handed in	

				Compute demand factors for ranges, wall mounted ovens, etc.				
				Select proper conductor sizes.				
				Ground all appliances properly.				
				Install circuits for dishwashers and waste disposals in compliance with CEC.				
13-14-15		Lecture	6	<u>Describe</u> Branch circuits for laundry, washroom and attic	Unit 16 Pg. 276-287 Section 10	Pg. 387 Ques. 1-14, 1-12	To be handed in Week 15 Review / test # 3	CEC, Residential Electrical Wiring
				CEC requirements for receptacle outlets.				
				Discuss the CEC rules pertaining to attics.				
		Lab	6	<u>Apply</u>				
				Demonstrate installation of EMT and PVC conduit		Lab Assignmt #7	To be handed in	
				Proper wiring and grounding connections for large appliances.				
				Various wiring methods.				
				Proper way to connect pilot lights and pilot light switches.				
16				Review.				