

SAULT COLLEGE OF APPLIED ARTS AND TECHNOLOGY

SAULT STE. MARIE, ONTARIO



**SAULT
COLLEGE**

COURSE OUTLINE

COURSE TITLE:	Introduction to Residential Wiring		
CODE NO. :	HMI 111	SEMESTER:	TWO
PROGRAM:	Home Inspection Technician		
AUTHOR:	Rob McTaggart		
PROFESSOR:	Stefan Tanninen		
DATE:	January 2015	PREVIOUS OUTLINE DATED:	January 2014
APPROVED:	<i>"Corey Meunier"</i>		
	CHAIR		DATE
TOTAL CREDITS:	THREE		
PREREQUISITE(S):	ELR130 - Electrical Fundamentals		
HOURS/WEEK:	THREE		

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I. COURSE DESCRIPTION:

This course introduces students to the Canadian Electrical Code, which is covered in conjunction with interpretation of construction drawings and specifications for residential installations, and demonstrated by hands-on activities.

II. LEARNING OUTCOMES AND ELEMENTS OF THE PERFORMANCE:

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

1. *State the purpose of the Canadian Electrical Code and identify which sections apply to a given electrical installation.***Potential Elements of the Performance:**

- State the objective, scope, and general arrangement of the Canadian Electrical Code (CEC).
- Identify the methods used to indicate code regulation changes for electrical equipment (other than heating) installed in an electrical equipment section of CEC.
- Explain terms as listed in the “Object, Scope and Definitions” section and the special terminologies located in the general rule of other sections of CEC.
- Interpret general rules (section 2) of CEC.

2. *Interpret the Canadian Electrical Code requirements pertaining to residential installations.***Potential Elements of the Performance:**

- Use architectural, electrical and residential drawings and specifications to determine installation requirements for a residential home.
- Identify and interpret the alphanumeric lines.
- Demonstrate competency with metric scale and imperial scale and be able to convert between the two.
- Read and apply residential specifications.
- Determine conductor sizes and types, wiring methods, wire connections, voltage drop, neutral sizing for services.
- Calculate ampacity and apply correction factors for conductors in a raceway or multi-conductor cable, including conductors in parallel.
- Interpret the regulations of CEC regarding wiring methods (section 12) for installations operating at 750 volts or less.
- Calculate conduit fill where all conductors are the same size and have the same insulation type.
- Calculate conduit fill where the conductors have different sizes and/or different insulation types.

- Calculate the maximum number of conductors sized # 14 to # 6 that is permitted in a box.
- Assess electrical outlets and fixtures needed in a single family dwelling, including junction boxes, non-metallic outlets and boxes for conduit wiring.
- Assess branch circuits for the bedrooms, study, hall, living room, front entry, bathrooms and kitchen.
- Identify special-purpose outlets for ranges, counter-mounted cooking units, wall mounted ovens, food waste disposal and dishwashers. This will also include laundry, washroom and attic.
- Determine electrical requirements for oil and gas heating systems, and electric heating and air conditioning.

3. *Use of personal, protective equipment.*

Potential Elements of the Performance:

- Select proper safety work boots, eye protection, clothing and gloves.

4. *Use of hand and power tools.*

Potential Elements of the Performance:

- Safe and correct use of the following:
 - hammers, chisels, pliers, screw drivers, cutters, wire strippers, etc.
- Hand benders, drills, saws and power actuated tools.

5. *Identify, select and use a variety of wiring and materials.*

Potential Elements of the Performance:

- Identify and select as required:
 - wiring, boxes and conduit

6. *Follow written and oral instruction necessary to perform required elements to complete an assigned practical task.*

Potential Elements of the Performance:

- Read and understand sketches provided:
 - use required formulas to calculate overall measurements
 - read and apply charts to obtain the correct materials

7. *Use a variety of methods required and materials to complete a specified practical assignment.*

Potential Elements of the Performance:

- Applying the skills of wiring:
 - panel boxes, wiring rooms, specialty outlets

III. TOPICS:

1. Canadian Electrical Code
2. Interpretation of residential plans and specifications
3. Calculations required for residential homes

IV. REQUIRED RESOURCES/TEXTS/MATERIALS:

- Ontario Electrical Safety Code (current edition) or Canadian Electrical Code Part 1 (current edition).
- Electrical Wiring Residential (Fifth Canadian Edition published by Ray C. Mullen)

V. EVALUATION PROCESS/GRADING SYSTEM:**Theory 70%**

- Quizzes (may be unannounced) 1% each to a maximum of 10 %
- Completion of unit questions 20%
- Three tests equally weighted total of 40 – 50%

Lab 30%

- Assessment of practical lab assignments 30%

PLEASE 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	Definition	<u>Grade Point Equivalent</u>
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: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.

VII. COURSE OUTLINE ADDENDUM:

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

HMI111 - Introduction to Residential Wiring

Week	Outcomes	Format	Hours	Topic/Content	Readings	Assignments	Assessment	Resources
1-2	1	Lecture	4	Interpret Canadian electrical code pertaining to residential installations.	Unit 1 pp. 1-7 Code sec. 0, 2	P. 7 Q. 1-12 Questions from end of chapters	Assign. to be handed in	Residential Electrical Book and Code book.
				<u>Describe</u>				
				Technical drawings, visualizing a building, building views, symbols, notations and scale. Drawings and specifications.	Unit 2 pp. 9-20	Ques. 1-20	Assign. to be handed in	
	1,2	Lab	2	<u>Apply</u>				
				Architectural, electrical and residential drawings to determine installation requirements.			Assign. to be handed in	
				Codes and standards, testing and units of measure.				
3-4	1,2,6	Lecture	4	<u>Identify</u>	Units 5,6,7 (to p. 123) Code sec. 0, 2	Questions from end of chapters	Assign. to be handed in	Residential Electrical book and Code book.
				Interpret the alphanumeric lines				
				Select as required; wiring, boxes, service panel size and conduit.				
				<u>Describe</u>				
				Overhead service and mast type, underground services, main service disconnect and grounding.				
		Lab	2	<u>Explain</u> Bonding, ratings for fuses and circuit breakers, panels and loads.			Assign. to be handed in	
				<u>Apply</u> Demonstrate competency with metric and imperial scale				

HMI111 – Introduction to Residential Wiring continued...

Week	Outcomes	Format	Hours	Topic/Content	Readings	Assignments	Assessment	Resources
5-6	2, 3, 4, 5,6,7 1,2 (test)	Lecture	4	<u>Describe / Explain</u> the method of estimating required wiring, boxes, service panel sizes and conduit.	Unit 7 (cont.) Code sec. 4,12	Questions from end of chapters	Assign. to be handed in Rev/test #1 (in week 6)	Residential Electrical book and Code book
				Determine conductor sizes and types, wiring methods, wire connections, voltage drop and neutral sizing for services.				
		Lab	2	<u>Apply</u>				
				Calculate conduit fill where all conductors are the same size and insulation type.	Unit 7 Code sec. 12	Questions from end of chapters	Assign. to be handed in	
7,8	1,2	Lecture	4	<u>Explain</u> Interpret the regulations of CEC regarding wiring methods for installations operating at 750 volts or less.	Unit 7 (p. 123 on), 11, 12 Code sec. 12	Questions from end of chapters	Assign. to be handed in	Residential Electrical book and Code book
	2,3,4,5, 6, 7	Lab	2	Calculate conduit fill where the conductors have different sizes.			Assign. to be handed in	
9	1,2	Lecture	2	Wire sizes and loads.				
	2,3,4,5, 6, 7	Lab	1	Calculate the maximum number of conductors sized # 14 to # 6 that is permitted in a box.			Assign. to be handed in	
10	1,2	Lecture	3	Review / test # 2			Rev/test #2 (in week 10)	Residential Electrical book and CEC.

HMI111 – Introduction to Residential Wiring continued...

Week	Outcomes	Format	Hours	Topic/Content	Readings	Assignments	Assessment	Resources
11,12,	1,2	Lecture	4	<u>Identify</u>	Units 14, 15, 16	Questions from end of chapters	Assign. to be handed in	Residential Electrical book and CEC.
				Assess electrical outlets and fixtures needed in a single family dwelling.	Code sec. 12, 26			
				Special purpose outlets for ranges, counter mounted cooking units, wall mounted ovens, disposals and dishwashers; including laundry appliances and attic.	Code sec. 26			
				<u>Describe</u>				
				Determine electrical requirements for oil, gas, electric heating and air conditioning.	Units 17, 18 Code sec. 62	Questions from end of chapters	Assign. to be handed in	
				Uses and installations of electrical conduit.				
				Requirements for service grounding and flexible metal conduit.				
	2,3,4,5,6, 7	Lab	2	<u>Apply</u>			Assign. to be handed in	
				Voltage drop calculations.				
				Calculations using CEC Table D-3.				

HMI111 – Introduction to Residential Wiring continued...

Week	Outcomes	Format	Hours	Topic/Content	Readings	Assignments	Assessment	Resources
13,14	1,2	Lecture	4	<u>Identify</u>				
				High temperature insulated conductors, wire device, breaker or switch.	Units 14-18 (also 11, 12) Code sect. 12, 26	Questions from end of chapters	Assign. to be handed in	Residential Electrical book and Code book
				Three - wire circuits				
				<u>Describe</u> (Wiring methods)				
				Assess branch circuits for the bedrooms, study hall, living room, front entrance, bathrooms and kitchens.	Unit 11 Pg. 195-211			
				<u>Identify</u>	Code sec. 0, 2, 4, 12, 26			
				Grounded and ungrounded conductors (color coding).				
				Toggle switches.				
				<u>Describe</u>				
				Operation that each type of toggle switch performs.				
				<u>Explain</u>				
				Various ways to bond wiring.				
				How to design circuits.				
	2,3,4,5,6, 7,	Lab	2	<u>Apply</u>			Assign. to be handed in	
				Correct wiring connections the CEC requires.	Units 14-18		Assign. to be handed in	
15	1,2	Lecture	3	Review and Test # 3			Rev / Test # 3 (in week 15)	
16				Review.				