

SAULT COLLEGE OF APPLIED ARTS AND TECHNOLOGY

SAULT STE. MARIE, ONTARIO



**SAULT
COLLEGE**

COURSE OUTLINE

COURSE TITLE: Installation Methods II

CODE NO. : ELR123 **SEMESTER:** 2

PROGRAM: Electrical Engineering Technician
- Process Automation and Trades
-

AUTHOR: Sean Hager / R. McTaggart

DATE: January 2015 **PREVIOUS OUTLINE DATED:** January 2014

APPROVED:

“Corey Meunier”

DATE

TOTAL CREDITS: 2

PREREQUISITE(S): None

HOURS/WEEK: 3

Copyright ©2014 The Sault College of Applied Arts & Technology
Reproduction of this document by any means, in whole or in part, without prior written permission of Sault College of Applied Arts & Technology is prohibited.
**For additional information, please contact Corey Meunier, Chair
Technology & Skilled Trades
(705) 759-2554, Ext.2610**

I. COURSE DESCRIPTION:

This hands-on course introduces the student to residential wiring practices.

II. LEARNING OUTCOMES AND ELEMENTS OF THE PERFORMANCE:

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

1. *Correctly select and safely install common residential electrical wiring systems and equipment within the regulations and standards set out by the Canadian Electrical Code (CEC).***Potential Elements of the Performance:**

- Demonstrate the correct installation procedures and wiring connections for common residential switching devices and outlets, ensuring strict adherence to CEC (Canadian Electrical Code) and NBC (National Building Code) regulations.
- Demonstrate the proper installation procedures required for the following wiring methods while ensuring strict adherence to CEC regulations: non-metallic sheathed cable, armoured cable, mineral insulated cable, metallic sheathed cable, rigid conduits, flexible conduits, liquid-tight conduit, electrical metallic tubing, and electrical non-metallic tubing.
- Demonstrate the ability to install a complete 100 amp, residential service including the following circuits: hot water heater, range outlet, dryer outlet, split duplex receptacle, bathroom outlet, outside weather-proof receptacle, general branch circuit.
- Prepare a layout drawing for a service mast and indicate the procedure for installation.
- Demonstrate the proper use of common hand tools used in the electrical trade.
- Demonstrate the proper installation of enclosures and fittings common to the electrical trade.
- Demonstrate the proper installation of cable, conduit and enclosure supports common to the electrical trade.
- Demonstrate the proper techniques for the terminating of conductors.
- Identify and terminate copper communication and hard wired cables for telephones.

III. TOPICS:

1. Residential Wiring Practices.

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, hack saw, claw hammer, tool pouch and tool box.
- Safety glasses and safety boots (hard toe shoe or boot minimum, green patch recommended).

V. EVALUATION PROCESS/GRADING SYSTEM:

| | |
|------------------|------------|
| Shop activities, | 50% |
| Practical Test/s | 25% |
| Written Test/s | <u>25%</u> |
| | 100% |

There will likely be one written test and one practical test and dates will be identified in class.

The professor reserves the right to adjust the number of tests, assignments and quizzes. Any modifications will be discussed in class. Test will not be returned but will be available for review.

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 postsecondary courses:

| 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. |

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.

Additional Information:

If a student misses a test he/she must have a valid reason (i.e. medical or family emergency – documentation such as a Doctor's note or death certificate may be required). A flat tire or vehicle problems are not a valid reason. In addition, the instructor must be notified prior to the test sitting. If this procedure is not followed the student will receive a mark of zero on the test 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.

Deadlines will be specified for submission of assignments for grading. Late assignments will not be accepted and a grade of 0 will be assigned.

Required texts are brought to each class. Sections of the course text books may be highlighted however they are not to be written in. Tests will be 'open book' as far as the textbooks are concerned. However, use of a book containing markings other than the aforementioned highlights is not permitted and will be considered as academic dishonesty. Students are responsible for supplying their own texts for tests. Sharing books during a test is not permitted

Any material covered during any absence legitimate or not is the responsibility of the student.

There are no make-up tests, assignments or extra work allowed for any reason.

Any material covered during any absence legitimate or not is the responsibility of the student.

Cell Phone Use Cell phones in the classroom are to be put on Silent or Vibrate during lectures, and labs.

Ringling during class will result in a deduction of 5% from the final grade per event.

During Tests, Cell Phones are to be *SHUT OFF* and put away, and are not to be used as a calculator.

Should your phone ring during a test or be pulled out for any reason you will be asked to hand your test in and immediately leave the classroom.

A Grade of 0% will be issued for that test.

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

Disruptions to classes such as lateness, excessive talking, inappropriate language, etc are not acceptable and will be dealt with on an individual basis.

Students will be given the opportunity to review / correct the test material

Students must continuously wear all Sault College required personal protective equipment (PPE) during lab activities.

Failure to do this will result in expulsion from the lab activity and a grade of zero being assigned.

Students are expected to be wearing their required PPE prior to entering the lab.

The instructor will advise what specific PPE is required. If a student repeatedly neglects to wear PPE as required he/she will be considered to be in violation of the Sault College Academic Code of Conduct and may be sanctioned accordingly (see Student Code of Conduct & Appeal Guidelines).

For instance, first violation – verbal warning, second violation written warning, third violation suspension from lab activities.

General Lab Requirement for Write Ups

Lab 1 requires no write up

Lab 2 through and including Lab 11 require write ups as outline below

- 1) Labs shall have a wiring diagram and CE code rules that relate to each lab as per instructions from the instructor.
- 2) Labs shall have a CAD wiring diagram of lab installation and related equipment.
- 4) Labs shall have Canadian Electrical Codes stated on the Lab Drawings
- 6) All labs assignments must be neat and turned in on hard copy one week from the day the lab was scheduled. A soft copy of the CAD drawing is to be available on request.
- 7) Labs must be computer generated and labs that require tables shall be done in a spread sheet or in a word processor the can produce a table. **Hand written reports will not be accepted.**
- 8) Each lab may have specific requirement so read each lab carefully.
- 9) If the student is not clear on any of the requirements, it is his/her responsibility to ask the instructor for clarification.
- 10) **All lab reports are to include a title page with the following information**
 - **Lab title and number**
 - **Date Completed**
 - **Names of group members**
 - **Instructor's name**
- 11) Lab reports are to include all procedures, diagrams and observation etc required in this course outline for the lab write-up to be complete.
- 13) One lab report submission per group, maximum 2 per group. The instructor may ask each member of a group to submit a separate lab report.

NOTE:

You must pass all sections of the course, theory, and the Lab portions of ELR 123 course to obtain a passing grade in this course. If the student passes all sections, the final mark will be the mark as stated for each section added together for the final mark. That is the theory mark, and lab marks will be added to arrive at a final student average for this course. If the student fails theory test, Practical Test, or lab section of this course he/she will receive an F grade (failing grade).

Methods of Evaluation

Demonstration of Labs, Lab write-ups and tests etc. will constitute a total of 100% of your ELR 123 course mark. The distribution of marks is as stated in the previous pages.

NOTES:

- Attendance is compulsory and may be taken each and every lab class or at random.
- Students missing any lab classes will still be responsible to have the particular lab completed, not simply copied from other student. You must indicate to the instructor when you plan to do the lab, you will be responsible for making arrangements to complete the lab and demonstrate it to the instructor.
- All drawings or diagrams must be done in AutoCAD or instructor approved drawing program.
- All labs will contain the material that was stated in previous pages
- All labs must be demonstrated and signed off by instructor before any of the labs write up can be marked.
- All labs must be signed by the instructor and student at the completion of each and every lab shop portion during the schedule lab class. Therefore when you have completed the lab steps and demonstrated the lab to the instructor, he/she will sign the lab and you may proceed with the next lab assignment. Auto Cad drawings, and all other lab requirements must be met before the labs can be handed in for marking.
- The student must demonstrate all lab projects assigned to the instructor to his/her satisfaction before the student can have the lab project signed by the instructor as being complete.
- All late labs are subject to 10% deduction per day that the lab is late.
- The instructor may alter or give particular instructions, or additional instructions on a per lab bases

REMEMBER:

Read all labs completely and any additional material that is included or handed out by the instructor that pertains to the labs. The student is responsible to make sure that he / she have read all material pertaining to a lab before starting the lab.

ALL students must **Demonstrate all labs** to the instructor and have the instructor sign your sheet that each lab was completed successfully.

Important Note:

- Attendance to shop activities is compulsory, unless discussed with the instructor in advance of the absence and the absence is for a medical or family emergency.

- Any student that is absent for any shop class will be required to provide a doctor's note immediately upon returning. Failing to do so will result in a grade of 0% being assigned to the missed shop activity.

Assigned Labs

LAB #1 Introduction To The Electrical Lab, Equipment, And Devices

LAB # 2 Lights, Switches And Receptacles Note Receptacles Are Not Switched.

- #1 15 amp feed first to the receptacle, then to switch and finally to the light.
- #2 15 amp feed first to the light, from the light to switch and finally light to the receptacle.
- #3 15 amp feed first to the light, then to the switch and from switch finally to the receptacle.
- #4 15 amp feed first to the switch, then to light and from light finally to the receptacle.

LAB #3 3-Way Switch Circuits

- #1 15 amp feed first to one 3-way switch, then to the other 3-way switch and finally to the light.
- #2 15 amp feed first to the light, from the light to one 3-way switch and finally to the other 3-way switch.
- #3 15 amp feed first to the light, then each switch from the light.
- #4 15 amp feed first to the one 3-way switch, then to the light, then to the other 3-way switch.

LAB #4 4-Way Switch Circuit

15 amp feed first to the one 3-way switch, then to the light, then to the other 4 & 3 way switch.

Practical Test – The practical test can be on anything covered in labs 2 to 4

Lab #5 A Kitchen Split Receptacle

Lab #6 Dryer Receptacle install and draw, Only draw Range Receptacle.

Lab #7 Door Bell Installation

Lab #8 Fluorescent Light With Ac90.

Fluorescent light and receptacle installation using armoured cable(AC90).

Lab #9 3 Wire Split Circuit

One light and one receptacle on each haft of the wire split circuit using only 3 conductor cable for lights & rec. 2 conductor for Switches

Lab #10 **Emt Protect**
GFCI Receptacle for surface mount

Lab #11 **SERVICE INSTALLATION** Overhead & Underground Drawing only
**Note; do a drawing for both an Overhead Service 200 amp service and
Underground 100 amp service include all necessary equipment type and size,
conductor type and size and related codes.**

Practical Test - The practical test can be on anything covered in labs 5 to 11

*NOTE: Refer to the C.E.C. code and list the references and rules that apply to these
installation*

**Note: All due labs must be completed, demonstrated and the write-ups must be
turned into the instructor before a student will be permitted to do the practical tests.
A student will receive a mark of zero (0) for the practical test if he/she does not meet
the above mentioned requirements or does not complete the practical test.**

VII. COURSE OUTLINE ADDENDUM:

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

- 1- Absolutely no make up tests or exams will be administered with the exceptions of personal illness or death of an immediate family member both requiring written verification.
- 2- All labs must be handed in by the due date or a grade of 0 will be awarded.
- 3- Lab & lecture attendance are compulsory. Any lecture notes, lab assignments etc. missed will become the student's responsibility to retrieve from another student.
- 4- Lab or lecture quizzes can be presented at anytime without prior notification.
- 5- All Labs must be completed during assigned Lab times unless prior approval is obtained from the instructor.
- 6- Students must be able to demonstrate labs that are assigned by the instructor after the due date if requested by the instructor. Each student must be sure that he / she can duplicate the lab that they turned in on or before the due date. If the student cannot duplicate the lab to the satisfaction of the instructor, a grade of 0% will be assessed to that particular lab. Demonstration request will be at the discretion of the instructor.
- 7- In order to maintain a passing grade the student must obtain a minimum 50% average in all subject sections that the course may have, such as, the theory Tests section, Practical Tests section, Lab & Lab Write-ups and Demonstrations of Labs to Instructor section.
- 8- Students are not permitted to work on live equipment outside of regular class time.
- 9- Students must supply their own hand tools, meters, safety boots and safety glasses. Students will not be permitted in the lab without wearing safety boots and glasses. Students must never work alone in the lab. Unsafe work habits, improper behavior will not be tolerated. PPE must be put on before entering the lab.
- 10- I have read and understand the requirements outlined above and in the course outline.

Student's Name: Printed

Student Number

(Student's Signature)

(Date)