College of Micronesia – FSM
P.O. Box 159
Kolonia, Pohnpei

Course Outline Cover Page

Electrical Wiring One — Course Title
VEM111 — Department and Number

Course Description: This course is designed to introduce students to basic concept of residential wiring and provide a solid background of electrical principles required for wiring. The students will develop the knowledge of identifying various voltages in various branch circuits as well as identifying various types of branch circuits used in a dwelling. The students will gain the understanding for special circuits and how they are used in a dwelling. The students will also become familiarized with the information and the specification to perform functional and safe wiring practices.

Prepared by: Grilly Jack **State:** Pohnpei Campus

	Hours per Week	No. Of Weeks	Total Hours	Semester Credits
Lecture	3/8	16/8	48	3
Laboratory				
		Total Semester Credits:		3

Purpose of Course

Degree Requirement	_____
Degree Elective	_____
Advanced Certificate	_____
Certificate	_____XX_____
Remedial	_____
Other (Workshop)	_____

Prerequisite Course(s): Admission and VSP 121

_____ **Signature, Chairman, Curriculum Committee**
_____ **Date Approved by Committee**

_____ **Signature, President, COM-FSM**
_____ **Date Approved by the President**

General Objective:

The students will become familiar with the basic residential wiring principles used in the industry. The students will also become familiarized with the various voltages and circuits used in residential wiring. The students will learn to operate in compliance with the National Electrical Code.

Learning Outcomes: Upon successful completion of this course the student will be able to:

1. Understand the electrical system and demonstrate the various installation methods.
2. Explain and identify electrical symbols and conductors.
3. Design an electrical wiring schematic.
4. Identify and install electrical boxes, switches and recessed lighting.
5. Recognize electrical interrupters and suppressors.
6. Understand ballast.
7. Describe branch circuit.
8. Identify various conductor sizes.
9. Identify and demonstrate bedroom, master bedroom and bathroom circuit.
10. Identify and demonstrate hallway, front porch and entry circuit.
11. Identify and demonstrate kitchen and dining room and living room circuit.
12. Understand and demonstrate laundry circuit.
13. Identify and demonstrate study, rear entry and family room circuit.
14. Design garage and basement circuit.
15. Explain workshop circuit and demonstrate the installation method.
16. Demonstrate water pump and water heater circuit.
17. Identify and perform stove and oven circuit installation.
18. Identify and explain food disposer and dishwasher circuit.
19. Understand and install vent fan circuit.
20. Understand and demonstrate electric heating and air conditioning circuit.
21. Recognize and demonstrate heat and smoke detector circuit.

STUDENTS SHOULD BE MADE AWARE OF OCCUPATIONAL HEALTH AND SAFETY ISSUES IN ALL SITUATIONS AND BE EXPECTED TO DEMONSTRATE SAFE WORKING PRACTICES AT ALL TIMES.

Outline of Content: This course contains:

1. Electrical system and installation
   - Three types of voltage
   - Typical voltage
   - Wiring symbols and specifications.
   - Electrical codes and Standards.

2. Electrical symbols and Conductors.
   - Outlets and their symbols.
   - Switches and their symbols.
   - Conductors and their symbols.
   - Miscellaneous symbols.
   - Conductors' sizes and types.
   - Conductor insulation types.
   - Conductor color-coding.

3. Electrical wiring schematic.
   - Service power and protective devices.
   - Two and three conductor wiring.
   - Sheathing and conductors.

4. Electrical boxes, switches and recessed lighting.
   - How electrical boxes are used.
   - Box installation.
   - How boxes are wired for outlets and switches.
   - Standard 0ne pole switch.
   - Standard three way switch.
   - Standard four way switch.
   - Two pole switch.
   - Voltage factors
   - Recessed lighting installation

5. Interrupters and Suppressors.
   - GFCI
   - IDCI
   - TVSS
   - IG

6. Ballast.
    - Operation.
    - Installation.

7. Branch Circuit.
    - Number of branch circuits
    - Number of outlets per circuit.
    - Number of lights per circuit.

8. Conductor Sizing.
    - Allowable amperage.
    - De-rating factor.
    - Restrictions

9. Master bedroom, Bathroom and Bedroom.
    - Group outlets
    - Receptacle placement.
    - Lighting requirements.
    - Wiring methods for master bedroom.
    - Receptacle placement for master bedroom.
    - Paddle fan requirements.
    - Receptacle requirements for bathroom.
    - Lighting for bathroom.
    - Grounding requirements.

10. Hallway, front and entry.
    - Three way circuit.
    - Porch circuit.
    - Entry circuit

11. Kitchen, Dining and living.
    - Receptacle for small appliances.
    - Split circuit.
    - Lighting requirements.
    - Grounding requirements.
    - Track lighting and dimmer system.

12. Laundry.
    - Receptacle requirements.
    - Dryer connection.
    - Grounding requirements.

13. Study, rear entry and family room.
    - Receptacle requirements.
    - Lighting requirements.

14. Garage and basement
    - Receptacle requirements.
    - Lighting requirements.
    - NEC regulations.

15. Workshop.
    - Receptacle requirements.
    - Lighting requirements.
    - Multi- outlet
    - Grounding requirements.

16. Water pumps and Water heaters.
    - Jet
    - Submersible
    - Heaters
    - Wiring method
    - Conductor sizing.

17. Stove and Oven.
    - Operation
    - Conductors
    - Current requirements.
    - Wiring method.

18. Disposer and dishwasher.
    - Operation.
    - Conductors
    - Current requirements.
    - Wiring methods.

19. Vent Fan.
    - Operation
    - Conductor sizing.
    - Current requirements.
    - Wiring methods.

20. Heating and air-conditioning.
    - Operation
    - Conductor sizing.
    - Current requirements.
    - Wiring method

21. Smoke Detectors.
    - Operation
    - Conductor sizing.
    - Current requirements.
    - Wiring method.

Learning Outcomes: **On completion of this course the learner will be able to:**

Learning Outcome 1: **Understand the electrical system and demonstrate the various installation methods.**

Assessment Criteria

a. Understand the three parts of the electrical supply system.
b. Explain the typical electrical voltage in the supply system.
c. Describe how the electrical wiring information is conveyed to electricians using symbols.
d. Discuss the purpose of electrical specifications.
e. Explain the agencies responsible for establishing the electrical codes and standards.
f. Demonstrate safe wiring practices.

Assessment Method

Multiple choice questions
Short answer questions
Practical Exercises/Test

Learning Outcome 2 : **Explain and identify electrical symbols and conductors.**

Assessment Criteria

a. Explain outlets and recognize their symbols.
b. Describe switches and identify their symbols.
c. Explain conductors and recognize their symbols.
d. Describe conductors and their sizes.
e. Discuss various methods of insulations.
f. Explain conductor color-coding.

Assessment Method

Multiple choice questions
Short answer questions
Practical Exercises/Test

Learning Outcome 3: Design an electrical wiring schematic.

Assessment Criteria

a. Identify the purpose of a switch and its schematic diagram.
b. Describe a single pole & single throw switch and a single pole and double throw switch.
c. Describe four types of switches and their schematic diagrams.
d. Identify the purpose a circuit protection device.
e. Identify a fuse and circuit breaker.
f. Explain the schematic diagram for electrical circuits.

Assessment Method

Multiple choice questions
Short answer questions
Practical Exercises/Test

Learning Outcome 4: Identify and install electrical boxes, switches and recessed lighting.

Assessment Criteria

a. Identify boxes and describe how they are used.
b. Explain how boxes are installed.
c. Demonstrate how boxes are wired.
d. Discuss one pole switch operation and installation.
e. Describe three way switches operation and installation.
f. Identify four way switches operation and installation
g. Explain two pole switches operation and installation
h. Understand the voltages used in residential wiring and the factors involved.
i. Describe recessed lighting.

Assessment Method

Multiple choice questions
Short answer questions
Practical Exercises/Test

Learning Outcome 5 : Recognize electrical interrupters and suppressors.

Assessment Criteria

a. Explain ground fault circuit interrupters (GFCI).
b. Identify immersion detection circuit interrupters (IDCI).
c. Identify transient voltage surge suppressors (TVSS).
d. Identify isolated ground receptacles (IG).

Assessment Method

Multiple choice questions
Short answer questions
Practical Exercises/Test

Learning Outcome 6: Understand ballast.

Assessment Criteria
a. Understand and describe ballast.
b. Describe ballast installation.
c. Identify the components used in the circuit.

Assessment Method
Multiple choice questions
Short answer questions
Practical Exercises/Test

Learning Outcome 7: Describe branch circuit.

Assessment Criteria
a. Explains how numbers of branch circuit is determined.
b. Discuss how you can determine the number outlets per branch circuit.
c. Explain how to determine the number of lights per circuit.

Assessment Method
Multiple choice questions
Short answer questions
Practical Exercises/Test

Learning Outcome 8: Identify various conductor sizes.

Assessment Criteria
a. Use the NEC book, table 310-16 to determine the allowable amperage for various cable sizes.
b. Describe the de-rating factors and restrictions for conductors.

Assessment Methods
Multiple Choice Questions
Short Answer Questions
Practical Exercises/Test

Learning Outcome 9: Identify and demonstrate bedroom, master bedroom and bathroom circuit.

Assessment Criteria
a. explain the methods used for group outlets.
b. Demonstrate the general wiring methods for bedroom and how the receptacles are placed.
c. Explain how lighting fixtures are used in closets to meet NEC requirements.
d. Demonstrate the wiring method for master bedroom.
e. Perform the two circuit receptacles.
f. Explain the NEC requirement for paddle fans.

Assessment Methods
Multiple Choice Questions
Short Answer Questions
Practical Exercises/Test

Learning outcome 10: **Identify and demonstrate hallway, front porch and entry circuit.**

Assessment Criteria:
a. Explains the lighting requirements.
b. Demonstrate three-way switch circuit.
c. Explain entry circuit.
d. Identify components used in the circuit.

Assessment Method:
Multiple Choice Questions
Short Answer Questions
Practical Exercises/Test

Learning outcome 11: **Identify and demonstrate kitchen and dining room and living room circuit**.

Assessment Criteria.
a. Identify the receptacle requirements for small appliances.
b. Demonstrate split circuit application.
c. Explain the lighting requirement.
d. Perform ground wiring requirements.
e. Explain track lighting.
f. Install receptacles

Assessment Method:
Multiple Choice Questions
Short Answer Questions
Practical Exercises/Test

Learning outcome 12: **Understand and demonstrate laundry circuit.**

Assessment Criteria.
a. Understand the receptacle requirements.
b. Understand the lighting requirements.
c. Demonstrate the wiring method lights.
d. Perform electrical dryer connections.
e. Perform dryer frame grounding.

Assessment Method:
Multiple Choice Questions
Short Answer Questions
Practical Exercises/Test

Learning outcome 13: Identify and demonstrate study, rear entry and family room circuit.

Assessment Criteria.
a. Explain the receptacle requirements.
b. Identify the use of valance lighting and surge protectors.
c. Explain the lighting requirement.
d. Demonstrate the grounding methods.

Assessment Method: Multiple Choice Questions
Short Answer Questions
Practical Exercises/Test

Learning outcome 14: Design garage and basement circuit.

Assessment Criteria. a. Identify the receptacle requirements.
c. Identify the lighting requirement.
d. Demonstrate the grounding method.
e. Perform the use and the NEC requirements for outdoor outlets and wiring.

Assessment Method: Multiple Choice Questions
Short Answer Questions
Practical Exercises/Test

Learning outcome 15: Explain workshop circuit and demonstrate the installation method.

Assessment Criteria. a. Identify receptacle requirements.
b. Explain lighting requirement.
d. Understand the grounding requirement.
e. Demonstrate multi- outlet assembly.

Assessment Method: Multiple Choice Questions
Short Answer Questions

Learning outcome 16: Demonstrate water pump and water heater circuit.

Assessment Criteria. a. Explain the operation of jet pumps and submersibles
b. Perform the wiring method for jet and submersible pumps.
d. Identify the conductors and over current devices used for jet and submersible pumps.
e. Understand the operation of water heaters.
f. Demonstrate the wiring method for heaters.
g. Identify the conductors and the protection devices used for heaters.

Assessment Method: Multiple Choice Questions
Short Answer Questions
Practical Exercises/Test

Learning outcome 17: **Identify and perform stove and oven circuit installation.**

Assessment Criteria.
a. Explain the operation of stove and oven.
b. Demonstrate the wiring method for stove and oven.
d. Identify the conductor and protection devices used for ovens stoves.

Assessment Method:
Multiple Choice Questions
Short Answer Questions
Practical Exercises/Test

Learning outcome 18: **Identify and explain food disposer and dishwasher circuit.**

Assessment Criteria.
a. Explain the operation of food disposal and dishwasher.
b. Demonstrate the wiring method for food disposal and dishwasher.
d. Identify conductor and protection devices used.

Assessment Method:
Multiple Choice Questions
Short Answer Questions
Practical Exercises/Test

Learning outcome 19: **Understand and install vent fan circuit.**

Assessment Criteria.
a. Explain the operation for vent circuit.
b. Demonstrate the wiring method.
d. Identify conductor and protection devices used.

Assessment Method:
Multiple Choice Questions
Short Answer Questions
Practical Exercises/Test

Learning outcome 20: **Understand and demonstrate electric heating and air conditioning circuit.**

Assessment Criteria.
a. explain the operation an electrical heating system.
b. explain the operation of an air-conditioning unit.
c. Demonstrate the wiring method for air conditioning unit.
d. Identify the conductors and the protection devices used in the circuit.

Assessment Method:
Multiple Choice Questions
Short Answer Questions
Practical Exercises/Test
Practical Exercises/Test

Learning outcome 21: Recognize and demonstrate heat and smoke detector circuit.

Assessment Criteria.
a. Recognize the operation of a heat and smoke detector system.
b. Demonstrate the wiring method for heat/ smoke detector system.
c. Identify the conductors and the safety devices used in the circuit.

Assessment Method:
Multiple Choice Questions
Short Answer Questions
Practical Exercises/Test

Required Course Materials:

1. Instructor:

a. CAI
b. Laboratory equipment with tools of the trade
c. Text, Teacher's Resource Guide, workbook
d. Overhead projector, transparencies

2. Student:

a. Text(s), handouts provided by instructor
b. Ring binder
c. College ruled note sheet, pencil or pen
d. Scientific calculator

Reference Materials:

Principles of Electric Circuits, *Sixth Edition*
Thomas L. Floyd.

Method of Instruction:

1. Computer Aided Instruction
2. Practical/Experimentation

Evaluation:

Final Grade for this course will be based on meeting the course requirements at the following percentage rates:

90% - 100%	A – Superior
80% - 89%	B – Above Average
70% - 79%	C – Average
60% - 69%	D – Below Average
0 % - 59%	F – Failure

Attendance:

The COM-FSM attendance policy will apply.