

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

Course Outline Cover Page

Radio Communications

Course Title

VEE 230

Department and Number

Course Description: This course provides the student with general communication theory of AM and FM receivers and transmitters.

Prepared by: Brent Villiers

State: National Campus

	Hours per Week	No. Of Weeks	Total Hours	Semester Credits
Lecture	3/6	16/8	48	3
Laboratory				
Total Semester Credits:				3

Purpose of Course

Degree Requirement	<u>XX</u>
Degree Elective	<u> </u>
Advanced Certificate	<u> </u>
Certificate	<u> </u>
Remedial	<u> </u>
Other (Workshop)	<u> </u>

Prerequisite Course(s): VEE 125 Electronic Circuits

Signature, Chairman, Curriculum Committee

Date Approved by Committee

Signature, President, COM-FSM

Date Approved by the President

General Objective:

This course is designed to familiarize the students with basic communication systems and the method by which signals are transmitted and received via AM, FM and SSB techniques, as well as the various types and characteristics of transmission lines.

Learning Outcomes:

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

1. Describe the basic communications system, various signal processing techniques and the safety precautions to be observed when dealing with this type of equipment.
2. Describe and measure Amplitude Modulated signals.
3. Describe and measure Frequency Modulated signals.
4. Identify Single Sideband transmitters and receivers, different types of transmission lines and their characteristics.
5. Describe Amplitude Modulated circuits.
6. Describe basic Amplitude Modulation circuit construction.
7. Measure signals in a diode modulator and demodulator circuit.
8. Troubleshoot Amplitude Modulated transmitter and receiver systems.
9. Describe Frequency Modulated circuits.
10. Describe basic Frequency Modulated Circuit operation.
11. Describe Frequency Modulated transmitter and receiver circuits.
12. Observe the operation and measure signals in an integrated circuit transmitter and receiver.
13. Troubleshoot Frequency Modulated transmitters and receivers.

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. Communication Systems and Signal Processing
 - Basic communications system
 - Limiting factors
 - Signal processing techniques
 - Safety

2. Amplitude Modulation
 - The characteristics of Amplitude Modulation
 - Various modulator and demodulator circuits
 - Operation of Amplitude Modulated transmitters and receivers
 - Troubleshooting
3. Frequency Modulation
 - The characteristics of Frequency Modulation
 - Various modulator and demodulator circuits
 - Operation of Frequency Modulated transmitters and receivers
 - Troubleshooting
4. IC Frequency Modulation circuit operation
 - Observe and measure signals in an IC transmitter and receiver

Learning Outcomes:

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

Learning Outcome 1

Describe the basic communications system, various signal processing techniques and the safety precautions to be observed when dealing with this type of equipment.

Assessment Criteria

- a. Describe the basic elements that compose a communication system.
- b. State the two fundamental limiting factors in a communication system.
- c. Describe the basic difference between analog and digital signals.
- d. Identify various signal processing techniques.
- e. Describe safety.
- f. Describe warning/caution statements and tags.
- g. Describe personal and laboratory safety habits.

Assessment Method

Multiple choice questions
Short answer questions

Learning Outcome 2	Describe and measure Amplitude Modulated signals.
Assessment Criteria	<ul style="list-style-type: none">a. Describe Amplitude Modulation and discuss the characteristics of Amplitude Modulated signals.b. Generate Amplitude Modulated signals using a function generator.c. Observe and measure the characteristics of an Amplitude Modulated signal.
Assessment Method	Multiple choice questions Short answer questions Practical exercises/tests
Learning Outcome 3	Describe and measure Frequency Modulated signals.
Assessment Criteria	<ul style="list-style-type: none">a. Describe Frequency Modulation.b. Describe the characteristics of Frequency Modulation.c. Generate Frequency Modulated signals using a Function Generator.d. Observe and measure the characteristics of a Frequency Modulated signal.
Assessment Method	Multiple choice questions Short answer questions Practical exercises/tests
Learning Outcome 4	Identify Single Sideband (SSB) transmitters and receivers, different types of transmission lines and their characteristics.
Assessment Criteria	<ul style="list-style-type: none">a. Identify SSB operating principles.b. Identify the operation of a SSB transmitter and receiver.c. Identify transmission line operating characteristics.d. Identify the different types of transmission lines.
Assessment Method	Multiple choice questions Short answer questions
Learning Outcome 5	Describe Amplitude Modulated (AM) circuits.
Assessment Criteria	<ul style="list-style-type: none">a. Describe a diode AM modulator circuit.b. Describe a transistor collector AM modulator circuit.c. Describe a transistor series AM modulator circuit.e. Describe a diode AM demodulator circuit.f. Describe a transistor AM demodulator circuit.

Assessment Method	Multiple choice questions Short answer questions
Learning Outcome 6	Describe basic Amplitude Modulation circuit construction.
Assessment Criteria	a. Construct an AM diode modulator circuit. b. Measure signals in an AM diode modulator circuit. c. Construct an AM diode demodulator circuit. d. Measure signals in an AM diode demodulator circuit.
Assessment Method	Multiple choice questions Short answer questions Practical exercises/tests
Learning Outcome 7	Measure signals in a diode modulator and demodulator circuit.
Assessment Criteria	a. Observe the operation of a transistor collector modulator transmitter. b. Measure signals in a transistor collector modulator transmitter. c. Observe the operation of a diode demodulator receiver. d. Measure signals in a diode demodulator receiver.
Assessment Method	Multiple choice questions Short answer questions Practical exercises/tests
Learning Outcome 8	Troubleshoot Amplitude Modulated transmitter and receiver systems.
Assessment Criteria.	a. Determine if an AM transmitter and receiver system is operating correctly. b. Describe the characteristics of Frequency Modulation. c. Generate Frequency Modulated signals using a Function Generator. d. Observe and measure the characteristics of a Frequency Modulated signal.
Assessment Method	Multiple choice questions Short answer questions Practical exercises/tests

Learning Outcome 9**Describe Frequency Modulated circuits.**

Assessment Criteria

- a. Describe a reactance modulator circuit.
- b. Describe a Varactor modulator circuit.
- c. Describe an IC voltage controlled oscillator.
- d. Describe a slope demodulator circuit.
- e. Describe a ratio demodulator circuit.

Assessment Method

Multiple choice questions
Short answer questions

Learning Outcome 10**Describe basic Frequency Modulated Circuit operation.**

Assessment Criteria

- a. Construct a FM reactance modulator circuit.
- b. Measure signals in a FM reactance modulator circuit.
- c. Construct an FM slope demodulator circuit.
- d. Measure signals in a FM slope demodulator circuit.

Assessment Method

Multiple choice questions
Short answer questions
Practical exercises/tests

Learning Outcome 11**Describe Frequency Modulated transmitter and receiver circuits.**

Assessment Criteria

- a. Observe the operation of a Varactor (VCO) modulator transmitter.
- b. Measure signals in a Varactor (VCO) modulator transmitter.
- c. Observe the operation of a discriminator demodulator receiver.
- d. Measure signals in a discriminator demodulator receiver.
- e. Observe the operation of a ratio demodulator receiver.
- f. Measure signals in a ratio demodulator receiver.

Assessment Method

Multiple choice questions
Short answer questions
Practical exercises/tests

Learning Outcome 12 Observe the operation and measure signals in an integrated circuit transmitter and receiver.

Assessment Criteria a. Observe the operation of an IC transmitter and receiver.
b. Measure signals in an IC transmitter and receiver.

Assessment Method Multiple choice questions
Short answer questions
Practical exercises/tests

Learning Outcome 13 Troubleshoot Frequency Modulated transmitters and receivers.

Assessment Criteria a. Determine if a FM transmitter and receiver system is operating correctly.
b. Identify the faulted circuit in a malfunctioning FM transmitter and receiver system.

Assessment Method Multiple choice questions
Short answer questions
Practical exercises/tests

Required Course Materials:**1. Instructor:**

- a. CAI Classroom with whiteboard or chalkboard
- 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:

Electronic Devices, *Fourth Edition*
Thomas L. Floyd,

Modern Electronic Communication, *Seventh Edition*
Gary M. Miller, Jeffrey S. Beasley

Method of Instruction:

1. Computer Aided Instruction
2. Practical/Experimentation
3. Lecture/Demonstration

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