CREDIT HOURS: 3.00

CONTACT HOURS: 60.00

COURSE DESCRIPTION:
A study of the fundamental concepts of communications systems and techniques. Topics covered include amplitude, frequency, phase and pulse modulation concepts, two way systems, basic TV systems and noise and information theory. Introduction to the circuitry of the A-M and F-M superheterodyne receiver, with emphasis on amplifier coupling, AM and FM detectors and similarities and differences between the AM and FM systems.

PREREQUISITES: EE 111

EXPECTED COMPETENCIES:
Upon completion of the course the students should be able to understand the following:

- Some of the difficulties with early forms of communication
- How electricity was first used to overcome some of the limitations of communications.
- What is used to make electrical currents assume the patterns of the human voice?
- How the sun’s radiation differs from and is similar to the human voice.
- How radiation overcomes the disadvantages of the human voice.
- How radio stations differ.
- A briefly history of communications.
- Some important concepts in instrumentation.
- The purpose of an antenna ground system.
- The function of turner and how it receives different frequencies.
- Why the reproducer cannot function directly from the carrier.
- What detection is and why it is necessary.
- What all communication receivers have in common.
- What a spectrum analyzer does and how it operates.
- The fundamentals of waveform analysis and the meaning of the Fourier series.
- A more detail analysis of waveforms.
- What block diagrams mean and how to troubleshoot them?
- How to analyze an AM waveform.
- The definition of noise and how noise is measured.
- How an AM waveform is measured using the modulation index.
- What spectrum analysis of an AM wave reveals.
- How the AM waveform is transmitted and what is required to make modulation occur.
- What a superheterodyne receive is and why it is superior to other receivers.
- The definition of gain and sensitivity and how they are measured.
- How to use dBm to calculate power in a communication system.
- Sources of noise and noise reduction.
- Troubleshooting techniques in signal tracing and signal injection.
- The building blocks of AM transmitters.
What factors determine transmission power
Different types of sideband systems
How sidebands are produced and how to measure them
How to distinguish between the following sideband system: (A) vestigial, (B) suppressed carrier, (C) single sideband.
The building blocks of SSB receivers.
Independent sideband transmitters.
How to measure carrier rejection in SSB transmitters.
The similarities of AM and FM transmission.
What frequency modulation is and how it is produced.
Details of the frequency spectrum and FM bandwidth
How to analyze FM transmitters.
How to analyze FM transmitters and What PM is.
How stereo FM systems function
Principles and uses of a sweep generator.
The transmission requirements of TV in the United States.
How the TV picture is created and its relation to the transmitted TV signal.
Basic operation of a black-and-white TV receiver.
Basic operation of a TV receiver.
The principles of stereo TV and its other possibilities.
Principles of videocassette recorders.
Basic principles of computer-aided troubleshooting.
Some of the basic concepts of transmission lines.
The impedance considerations of transmission lines.
The fundamental properties of standing waves as they apply to transmission lines.
The basis theory of antennas and some applications.
How radio waves are transmitted through space and the effects of space on their propagation.
Baluns.
Impedance-matching consideration when using the RF signal generator.
How to amplifyors are classified in terms of the frequencies they amplify.
The various kinds of devices used for amplifiers.
What all amplifiers have in common.
Different classes of amplifiers operation.
The difference between small-signal amplifiers and power amplifiers.
How amplifiers are used in communications equipment.
System gain considerations.
How to analyze a transistor audio amplifier circuit from a troubleshooting standpoint.
What an oscillator is and the basic requirements of all oscillators.
The types of oscillators used in communication circuits.
The basic principles of modulators.
Modulators used in frequency and phase modulation
Generation of spurious signal
The causes of unwanted oscillation in communication circuits.
The underlying principles of demodulators.
Automatic gain control (AGC) principles and circuits.
The principles AM demodulator circuits used in AM receivers.
• The principles FM and PM demodulator circuits used in receivers.
• What active filters are as well as their advantages and disadvantages?
• The theory of operation of crystal filters.
• How to measure the frequency response of combinations circuits.
• The fundamentals of power supplies used in communication systems.
• The basic concepts of series regulators.
• The basic concepts of parallel (shunt) regulators.
• The IC devices used in power supplies
• The fundamentals of switching regulators.
• Applications of switching regulators.
• LM340 regulator used.
• How to troubleshoot and analyze power supply problems

ASSESSMENT METHODS:
Student performance may be assessed by examination, quizzes, case studies, oral conversation, group discussion, oral presentations. The instructor reserves the option to employ one or more of these assessment methods during the course.

GRADING SCALE:
90%-100% = A
80%-89.9% = B
70%-79.9% = C
60%-69.9% = D
<60% = E