

**University of Arkansas - Fort Smith**  
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## **General Syllabus**

### **ELEC 2753 Communication Systems**

Credit Hours: 3

Lecture Hours: 2

Lab Hours: 2

Prerequisite: ELEC 1242 Introduction to Electronics Technology

Prerequisite or Corequisite: ELEC 2733 Advanced Electronic Circuits

Effective Catalog: 2018-2019

#### **I. Course Information**

##### **A. Catalog Description**

Covers AM and FM receiver theory, alignment and troubleshooting. Details theory and practical application of troubleshooting techniques as applied to superheterodyne receivers, audio amplifiers, and stereo systems.

##### **B. Additional Information**

This course is the student's first introduction to a complete electronic communication system with its relevant theory and the required troubleshooting techniques pertinent to systems having many complex circuits. AM and FM troubleshooting complements other courses, particularly advanced electronic circuits, in building the student's knowledge of additional electronic circuits common to many types of equipment. In addition, the student is introduced to efficient methods for isolating troubles to individual circuits and components by signal tracing, signal substitution and voltage analysis techniques. The student is introduced to radio frequency test equipment. Concentrated experience is gained in testing and troubleshooting of common CB radio receivers using standard and special test equipment and service data. Particular emphasis is placed on CB transceivers.

The student is introduced to the theory of AM and FM radio circuits, troubleshooting and alignment methods for radio receivers. Topics discussed are AM and FM modulation and demodulation principles, tuned amplifiers, mixers and converters, discriminators, ratio detection, AVC, superheterodyning, and frequency conversion. Heavy emphasis is placed on lab work, where experience is gained in actual troubleshooting of CB transceivers using standard test equipment and methods. Citizens Band

transceivers are used to teach test and troubleshooting of phase locked loop frequency synthesizers.

The skills learned will be immediately useful to the student in radio repair work. In addition, the knowledge and skills constitute an introduction to other more complex equipment such as TV, mobile, maritime, avionics and CB receivers.

Development of speaking skills are an important part of this course. Besides locating the cause of equipment failures in the lab, the student must develop skill in providing clear, accurate and logical oral explanations of his methods of troubleshooting, results of measurement and his deductive reasoning. Efficiency is rewarded.

## II. Student Learning Outcomes

### A. Subject Matter

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

1. Draw the block diagrams for AM, FM AM/FM and stereo receivers.
2. Draw and explain the details of AM and FM modulated carrier waveforms.
3. Describe the operation of CB receiver circuits.
4. List/draw expected voltage levels, frequencies and I/O waveforms for all major CB circuit blocks.
5. Select and operate appropriate test equipment for diagnosing and troubleshooting CB transceiver circuits.
6. Demonstrate the proper use of signal substitution for fault isolation while troubleshooting CB transceiver circuits.
7. Using the resources and facilities of the electronics laboratory, demonstrate the proper use of signal tracing to troubleshoot CB transceiver circuits.
8. Using the resources and facilities of the electronics laboratory, isolate faults using voltage and resistance methods while troubleshooting CB transceiver circuits.
9. Correctly identify and repair faults in frequency synthesizers with phase locked loops.

### B. University Learning Outcomes

This course enhances student abilities in the following areas:

#### Analytical Skills

**Critical Thinking** - Students in this class learn to analyze and troubleshoot faults in AM/FM transceiver circuits and phase locked loops. Students must

learn the proper analytical troubleshooting techniques to determine faults in circuits in the laboratory.

**Quantitative Reasoning** - Students must be able to utilize mathematics to solve various electrical problems.

### **III. Major Course Topics**

- A. Principles of Radio
- B. Amplitude Modulation
- C. AM Block Diagrams
- D. AM Circuit Analysis
- E. Frequency Modulation
- F. FM Block Diagram
- G. AM/FM Receivers
- H. FM Circuit Analysis
- I. Frequency Synthesizers
- J. C/B Transmitters
- K. Stereo Multiplex.