

I. COURSE INFORMATION:

- A. Division: Technical
- Department: Electricity/Electronics
- Course ID: ELECTR 220B
- Course Title: FCC Rules and Regulations
- Units: 3
- Lecture: 3 hours
- Laboratory: None
- Prerequisite: None
- Corequisite: None
- Dept. Advisory: None

- B. Catalog and Schedule Description: A review of the requirements for the General Radiotelephone Operator's License offered by the Federal Communications Commission

II. NUMBER OF TIMES COURSE MAY BE TAKEN FOR CREDIT: One

III. EXPECTED OUTCOMES:

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

- A. Categorize the terms common to the electronics industry and particular to the commercial radiotelephone industry.
- B. Arrange and describe the emission types, frequency ranges and bandwidth of emission of amplitude modulation, frequency modulation, phase modulation, single sideband (full, reduced and suppressed carrier).
- C. Compare common symbols and define terminology used in the field of electronics.
- D. Inspect and describe the various digital logic gate circuits and binary, decimal, octal, and hexadecimal numbering systems.
- E. Set-up calculator procedures to solve addition, subtraction, division, multiplication, fractions, powers (exponents) and radicals (roots), percentage problems, and logarithms.
- F. Apply Ohm's law and power formulas to series, parallel, and series/parallel circuits and describe the operation of resistors in these types of circuits, resistive bridge circuits, voltage dividers and maximum power transfer problems.
- G. Prepare calculator procedures to solve impedance, reactance, time, frequency, and wavelength problems.
- H. Use the Thevenin equivalent circuit, Superposition, or Millman's theorems to solve single source or multiple source circuit problems.
- I. Apply algebraic problem solving procedures using Kirchhoff's voltage and current laws.
- J. Examine and describe antennas, transmission lines, and Effective Radiated Power (ERP).
- K. Define and describe magnetism, electromagnetism, electromagnetic induction, and use the common symbols and terminology.

IV. COURSE CONTENT:

- A. FCC Rules and Regulations
 - 1. Rules
 - 2. Regulations
- B. Quick-Reference Glossary
- C. Frequency Spectrum
 - 1. Emission classifications
 - 2. Emission types
 - 3. Necessary bandwidth designations
 - 4. Frequency ranges

- D. Direct Current
 - 1. Conductors and insulators
 - 2. Voltage
 - 3. Current
 - 4. Resistance
 - 5. Resistors
 - 6. Ohm's law
 - 7. Nickel-cadmium batteries
 - 8. Lead-acid batteries
- E. Alternating Current
 - 1. Frequency of a sine wave
 - 2. Period of a sine wave
 - 3. Amplitude of a sine wave
 - 4. The sawtooth wave
 - 5. The square wave
 - 6. Capacitors
 - 7. Inductors
 - 8. Phase relationships in AC circuits
 - 9. Impedance
 - 10. Time constant
- F. Transformers
 - 1. Transformer operation
 - 2. Transformers in impedance matching
 - 3. Transformer power losses
- G. Semiconductors
 - 1. Diodes
 - 2. Transistors
 - 3. Transistor circuit configurations
 - 4. Effect of positive input signals on transistor amplifiers
 - 5. Transistor switching
 - 6. Operating point
 - 7. Field effect transistor
 - 8. Unijunction transistors
 - 9. Zener diodes
 - 10. PIN diodes
 - 11. Tunnel diodes
 - 12. Hot-carrier diodes
 - 13. Silicon Controlled Rectifiers
 - 14. Triacs
 - 15. Photo diodes
 - 16. Varactors
 - 17. Operational amplifiers
 - 18. Phase locked loops
- H. Power Supplies
 - 1. The half-wave rectifier
 - 2. The full-wave rectifier
 - 3. Linear electronic voltage regulator
 - 4. Switching electronic voltage regulator
 - 5. Three-terminal regulators
 - 6. Voltage dividers
 - 7. The superposition theorem
- I. AM and FM Receivers
 - 1. Receiver basics
 - 2. Coupling between stages
 - 3. Image reception in AM receivers
 - 4. Image reception in FM receivers

5. Receiver performance
6. Filters
- J. Transmitters
 1. Oscillators
 2. Amplifiers
 3. Frequency multipliers
 4. Modulators
 5. Antenna current
 6. Peak envelope power
 7. Matching networks
 8. Parasitics
 9. Harmonics
 10. Neutralization
- K. Bandwidth of Emission
 1. Bandwidth of emission in AM transmitters
 2. Bandwidth of emission in FM transmitters
- L. Antennas
 1. Resonant frequency of antennas
 2. Hertz Antenna (dipole)
 3. Marconi antenna
 4. Other antennas
 5. Antenna gain
 6. Other antenna considerations
 7. Electromagnetic radiation patterns
 8. Antennas and harmonics
- M. Transmission Lines
 1. Velocity factor
 2. Importance of impedance matching
 3. Power transfer in transmission lines
 4. Matching systems
 5. Characteristics of partial wavelength sections of transmission lines
- N. Effective Radiated Power (ERP)
 1. Calculating ERP
 2. Calculating power change
 3. Field strength
- O. UHF and Above
 1. Circuit considerations
 2. Transmission lines
 3. Vacuum tubes
 4. Ferrite devices
- P. Motors and Generators
 1. The AC generator
 2. The DC generator
 3. The shunt-wound generator
 4. Motors (DC)
 5. Shunt motors
 6. Series motors
 7. Compound DC motors
 8. The dynamotor
 9. The motor-generator
- Q. Measurements
 1. Voltage measurements
 2. Current measurements
 3. Power measurements
 4. Electrical energy measurements
 5. Resistance measurements

6. Frequency measurements
 7. Calculation of decibels
 8. The oscilloscope
 9. The spectrum analyzer
 10. Temperature measurements
- R. Digital Circuitry
1. AND gates
 2. NAND gates
 3. OR gates
 4. NOR gates
 5. NOT gates
 6. Flip-flops
 7. Astable multi-vibrator
 8. Monostable multi-vibrator
 9. Decade counters
 10. Logic probes
 11. Binary numbers
- S. Avionics
1. OMEGA navigation system
 2. Radar
 3. VOR (VHF omni-range)
 4. DME
 5. ATC
 6. Marker beacons
 7. ILS
- T. Radio Wave Propagation
1. Ground-wave propagation
 2. The ionosphere and sky-wave propagation
 3. Ionospheric layers
 4. Conditions that affect radio-wave propagation
 5. VHF propagation
- U. Satellite Communications
1. Orbital basics
 2. Transponders
 3. Propagation characteristics

V. METHODS OF INSTRUCTION: (Please check all that apply and add any additional not listed.)

- Lecture
- Class and/or small group discussion
- Critical evaluation of texts, newspapers, journal articles, and other printed research
- Critical evaluation of films, videotapes, audiotapes, or other media forms
- Classroom demonstrations
- Field trips
- Guest speakers
- Other:
- Other:
- Other:

VI. TYPICAL OUT-OF-CLASS ASSIGNMENTS:

- A. Reading Assignment. Reading assignments are required and may include (but are not limited to) the following: After reading the chapter on Satellite Communications, discuss in small groups the orbital basics.

- B. Writing Assignment. Writing assignments are required and may include (but are not limited to) the following: Write a complete variational summation of a series RC and a parallel RL circuit. Identify changes occurring from an increase in frequency.
- C. Critical Thinking Assignment. Critical thinking assignments are required and may include (but are not limited to) the following: Use a calculator to solve Ohm's law and power consumption problems.

VII. EVALUATION:

A student's grade will be based on multiple measures of performance and will reflect the objectives explained above. A final grade of "C" or better should indicate that the student has the ability to successfully apply the principles and techniques taught in this course. These evaluation methods may include, but are not limited to, the following (Please check all that apply, and add additional ones not listed):

- Portfolios
- Projects
- Written papers or reports
- Presentations (oral and visual)
- Work performance (internships or field work)
- Lab work
- Comprehensive examinations (cumulative finals or certifications)
- Peer evaluation
- Self evaluation
- Classroom participation
- Homework
- Other:
- Other:
- Other:

VIII. TYPICAL TEXTS:

- A. West, Gordon, GROL Plus, 2nd Edition, Master Publishing, Illinois, 2001
- B. Shrader, R. L., Electronic Communication, 6th Edition, Glencoe, New York, 2000

IX. OTHER SUPPLIES REQUIRED OF STUDENTS:

- A. Scientific calculator
- B. Scantron answer forms (882 or 882E)