Eastern WV Community & Technical College
Master Course Record

Course Prefix and Number: ELM 228
Course Title: Electronic Communication Systems II
Recommended Transcript Title: Electronic Communication Systems II
Date Approved/Revised: June 18, 2008
Credit Hours: 4 **Contact hours per week (Based on 15 week term):** **Lecture:** 3 **Lab:** 3
Prerequisite: ELM 227 – Electronic Communications Systems I or permission of Academic Program Director for Industrial Technologies. **Corequisite:** **Pre/Corequisite:**
Grading Mode: Letter grade
Catalog Description: This course is a continuation of Electronic Communication Systems I. It covers transmission lines including waveguides, antennas and propagation; microwave and radar systems; GPS, telephone and cellular networks; digital communications, computer networks, and fiber-optic/laser communication systems.
Course Outcomes: 1. Compare the construction of various types of transmission lines. 2. Categorize different connectors based on characteristic impedance and application. 3. Calculate characteristic impedance of various transmission lines. 4. Calculate transmission line losses versus power delivered to loads. 5. Calculate SWR and reflection coefficients using mathematical equations. 6. Compare electrical length and physical length of transmission lines. 7. Calculate basic transmission line quantities using a Smith chart. 8. Calculate the parameters associated with impedance matching. 9. Compare impedance matching of transmission lines with that of free space. 10. Sketch a diagram representing a traveling electromagnetic wave in space with orthogonal E and H vectors. 11. Calculate wave spreading loss. 12. Calculate antenna efficiency. 13. Sketch the radiation pattern for a dipole antenna (azimuth and elevation patterns). 14. Calculate the optimum antenna length for monopole and dipole antennas. 15. Compare the advantage/disadvantages of omnidirectional and directional antennas. 16. Compare the function of the Yagi-Uda and Log-periodic antennas. 17. Compare the signal path for parabolic reflector and cassegrain antennas. 18. Describe the procedures for antenna troubleshooting.

19. Compare the phenomena of reflection, refraction and diffraction.
20. Sketch a diagram illustrating the electromagnetic spectrum.
21. Calculate the distance to the radio horizon.
22. Compare the 3 modes for RF propagation.
23. Calculate receiver sensitivity.
24. Calculate free space path loss.
25. Calculate link budget parameters.
26. Compare the function of lumped and distributed circuit elements.
27. Calculate waveguide cut-off frequency.
28. Compare the function and uses of various microwave oscillators.
29. Compare the function and uses of various microwave amplifiers.
30. Calculate the effective range of a radar system.
31. Calculate Doppler shift frequencies.
32. Sketch a functional block diagram for a simple Doppler radio.
33. Compare the operation of pulse and DTMF signaling.
34. Sketch a simplified schematic diagram for a telephone set.
35. Compare the advantages/disadvantages of digital and analog telephony.
36. Sketch a functional diagram of a TDMA call routing systems.
37. Compare the operation of super-cell and cellular wireless systems.
38. Compare the multiplexing of the AMPS and PCS systems.
39. Compare the advantages/disadvantages of various PCS spectral management schemes.
40. Sketch a frequency domain representation of a typical ADSL signal.
41. Compare the operation of NBX and PBX telephone systems.
42. Sketch a functional block diagram of a complete digital communications system.
43. Compare serial and parallel traffic flow.
44. Compare the operation of various network topologies.
45. Sketch the pass band of a typical telephone line and explain the inherent incompatibility with digital data.
46. Calculate bandwidth requirements for FSK signaling schemes.
47. Compare the spectral efficiencies of FSK, PSK and QAM.
48. Compare the advantages/disadvantages of the UART and USART.
49. Compare various methods for error detection and correction.
50. Compare the DCE and DTE RS232 protocols.
51. Compare the utility, function and installation of various network cable types.
52. Calculate the addressing of the network and host addresses from IP and subnet masks.
53. Describe the operation of CHCP and ARP internet protocols.
54. Compare User Datagram and Transport Control protocols.
55. Apply the 7-layer open system interconnect model to troubleshooting a network.
56. Compare various types of satellite orbits and their relative advantages and disadvantages.
57. Discuss the 3 most common sources of technician serviceable failure and describe appropriate remedies.

58. Calculate the numerical aperture for various types of fiber-optic cables.
59. Compare the functional advantages/disadvantages of various light wave sources for fiber-optic cables.
60. Describe common types of fiber-optic systems failure and cost-effective ways to troubleshoot.

Implementation Cycle: Spring

Role in College Curriculum:
□ **General Education Core**
□ **Technical Core**
Ξ **Restricted Elective:** Electromechanical Technology
□ **General Elective**
□ **Workforce Education**
□ **Other**

Course Fee: Yes

Instructor's Qualifications: BS Engineering/Technology or related discipline and/or expertise and experience in the field.

Expanded Course Description:
This course will introduce the student to the methods of transmitting hi-frequency signals between sender and receiver. Transmission lines, radio-wave propagation, antennas, microwave devices, satellite communications and fiber optic cable will be covered. Analog and digital; audio and video; and communication systems used for television, cellar radio, personal communication systems, paging and wireless data networking will also be studied.

Prepared by:

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Name, Title Date

Approved Per LOT Minutes

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Dean, Academic and Student Services Date