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|  | **Convergence Technology****Syllabus****Last revision date: 09/21/2010****Course Number:** |
| **COURSE DESCRIPTION:** This course is a study on converging communications technologies. It includes the convergence of Voice, Video, image, and data over Internet Protocol over wired and wireless networks that provide seamless and secure communication solutions for business, government, and home technology needs. It emphasizes interoperability, the integrating of disparate systems, while emphasizing the revered goal of developing people interaction and communications skills. Hands-on Labs are required. |
| **PREREQUISITES:** Basic computer skills. |
| **RESOURCES:** This syllabus is based on *Telecommunications Essentials eLearning*, by Lillian Goleniewski, ISBN 13: 9780970741202.  *LIDO* [*Telecommunications Essentials*](http://www.telecomwebcentral.com/): by [Lillian Goleniewski](http://productsearch.barnesandnoble.com/search/results.aspx?ATH=Lillian+Goleniewski), 2nd edition, Addison-Wesley Professional, Copyright:  2007, 928 pp, [ISBN 10:   0-321-42761-0 -- ISBN-13: 9780321427618](http://www.cheapesttextbooks.com/Computers-Internet-Textbooks/Networking-Textbooks/Telecommunications-Essentials-Second-Edition-The-Complete-Global-Source-2nd-Edition-Lillian-Goleniewski-Kitty-Wilson-Jarrett-0321427610-9780321427618.html?gclid=COz8gMiY0qIC)*Network+ Guide to Networks*, Tamara Dean, March 9th 2009 by Course Technology (first published 2009) ISBN: 1423902459    (ISBN 13: 9781423902454)  |
| **ADDITIONAL REFERENCES**:Additional references are distributed in each applicable chapter. |

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| **WECM LEARNING OUTCOMES (Note WECM is Texas-specific – other states may want to include all outcomes as merely outcomes):**1. Describe the various technologies used in telecommunications.
2. Identify the architectures used in the telecommunications industry.
3. Name the key telecommunications industry protocols
4. Explain the application of technologies, architectures, and protocols used in the telecommunications industry.
5. Describe signaling and its importance to telecommunications.
6. Identify pro and con characteristics of Mobility emphasizing security.
7. Describe 1G, 2G, 3G, 4G, LTE, WiMAX and their role in present and future Mobility.

**ADDITIONAL LEARNING OUTCOMES RECOMMENDED:**1. Explain the various access technologies: PAN, HAN, LAN, CAN, MAN, and WAN including associated cellular and wireless network architectures.
2. Describe the principles of PSTN switching including the functionality of IP softswitches
3. Discuss the need and importance of transport in telecommunications.
4. Explain the reasons for the convergence of voice, data, image, and multimedia.
5. Explain how the Internet Protocol is key to convergence.
6. Appraise the importance of quality of service with regard to availability, reliability, and serviceability of a voice network.
7. Design a solution to a case study problem and create a presentation describing the results.
8. Describe the components involved in a “smart home” home network.
9. Describe the technology associated with using light waves to carry messages.
10. Explain the impact on human social behavior due to communications mobility
11. To communicate the importance of conferencing for the purpose of collaboration. Understand the components and demonstrate how to establish a collaboration session.
12. Understand and describe how energy savings can be a benefit from convergence technology and lend itself to “Green IT”.
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| **COURSE ASSESSMENT:** Class lectures/PowerPoints will cover and expand upon the assigned reading material. Labs will be used for hands-on experience. Regularly scheduled quizzes, tests, and exams will be administered by your instructor. Assignments, suggested schedules, and supplementary material to be distributed on the first day of class and posted to an online site provided by your instructor.

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| **Chapter Quizzes/Exercises** | 20% |  | **Grade Values:** |
| **Exams/Chapter tests** | 40% |  | **A** | 90-100 |
| **Lab exercises/Projects** | 20% |  | **B** | 80-89 |
| **Presentation/Case Study** | 10% |  | **C** | 70-79 |
| **Class participation/****Daily Work** | 10% |  | **D** | 60-69 |
| Final Grade  | **100%** |  | **F** | 59-Below |

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**COURSE SCHEDULE:** (Sequence of instruction recommended based on learning outcomes)

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| **Ch** | **Major Topics** | **Learning Outcomes** | **Reading Assignments** |
|  **1** |

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| Human–Machine Interactions  Embedded Devices Intelligent Wearables Traffic Patterns  |

 | Describe the various technologies used in telecommunications. (WECM #1) | Ch 1 – Introduction to Telecommunications  |
| **2** |

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| The Electromagnetic Spectrum  |
| Analog and Digital, Multiplexing |
| Media: Twisted-Pair, Coaxial Cable, Microwave, Satellites, Fiber Optics  |

 | Discuss the need and importance of transport in telecommunications. (WECM # 8)Explain the reasons for the convergence of voice, data, image, and multimedia. (WECM #9) | Ch 2 – Introduction to Transmission Quiz - Ch 1 |
| **3** |

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| Establishing Communication Channels: Circuit Switching,  |
| Packet Switching  |
| PDH & SDH/SONET Infrastructure  |
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 | Identify the architectures used in the telecommunications industry. (WECM #2)Describe the principles of PSTN switching including the functionality of IP soft switches. (WECM #7) | Ch 3 – Switching and Routing MessagesQuiz – Ch 2 |
| **4** |

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| Signaling Systems, SS7, and Intelligent Networks |

 | Describe signaling and its importance to telecommunications. (WECM #5) | Ch 4 – Telephony and Signaling SystemsQuiz – Ch 3 |
| **5** |

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| Data Communication Traffic |
| Data Transmission  |
| OSI and TCP/IP Reference Models  |

 | Explain how the Internet Protocol is key to convergence. (WECM #10) | Ch 5 – Data Networks and TrafficQuiz – Ch 4  |
| **6** |

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| LAN Transport and Standards  |  |
| LAN Access and Topologies  |  |
| LAN Switches, VLANs, and Bridges   |  |

 | Discuss the need and importance of transport in telecommunications. (WECM # 8) | Ch 6 – LANs (Local Area Networks)Quiz – Ch 5 |
| **7** |

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| Circuit-Switched, Leased Line Networks  |
| ISDN, Packet-Switched networks, X.25, Frame Relay and ATM |

 | Explain the reasons for the convergence of voice, data, image, and multimedia. (WECM #9) | Ch 7 – WANs (Wide Area Networks)Quiz – Ch 6 |
| **8** |

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| Internet and Routing Protocols |
| Internet Architecture, and Infrastructure  |
| Subnetting: IPv4, IPv6; DNS, QoS |
| Service Providers |

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 | Name the key telecommunications industry protocols. (WECM #4)Explain how the Internet Protocol is key to convergence. (WECM #10) | Ch 8 – Introduction to the Internet Mid-Term Exam – Chs (1 – 7) |
| **9** |

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| IPT Network Architecture, QoS  |
| VoIP Call Signaling Protocols  |
| Digital Voice, ENUM |
| VPNs: Layer 3, 2, SecurityUnified communications, IP voice and IPTV, Telepresence |

 | Describe signaling and its importance to telecommunications. (WECM #5)Explain how the Internet Protocol is key to convergence. (WECM #10)Appraise the importance of quality of service with regard to availability, reliability, and serviceability of a voice network. WECM #11)To communicate the importance of conferencing for the purpose of collaboration. Understand the components and demonstrate how to establish a collaboration session. WECM #16 | Ch 9 – Introduction to IP TelephonyQuiz – Ch 8 |
| **10** |

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| Television Basics, Digital TV Standards  |
| The Broadband Infrastructure  |
| Quality of Service, MPLS  |
|  Virtualization |
| Cloud Computing (workstations, servers, Storage) |

 | Discuss the need and importance of transport in telecommunications. (WECM # 8) Explain the reasons for the convergence of voice, data, image, and multimedia. (WECM #9)Appraise the importance of quality of service with regard to availability, reliability, and serviceability of a voice network. (WECM #11) | Ch 10 – Broadband, IPTV, QoS, and MPLSQuiz – Ch 9 |
| **11** |

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| Optical Networking Elements : Switches, Edge, Core |
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 | Describe the technology associated with using light waves to carry messages. (WECM #14) | Ch 11 – Introduction to Fiber Optic NetworksQuiz – Ch 10 |
| **12** |

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| DSL , Cable TV Networks,Packet Cable, Fiber Solutions,  |
| Wireless Broadband,  |
| HANs PANs, CANs, MANs |
| Broadband PLT  |

 | Explain the various access technologies: PAN, HAN, LAN, CAN, MAN, and WAN including associated cellular and wireless network architectures. (WECM #6)Describe the components involved in a “smart home” home network. (WECM #13) | Ch 12 – Wired and Wireless BroadbandQuiz – Ch 11 |
| **13** |

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| Antennas, Wireless Bandwidth,  Spectrum Utilization,  |
| Spread Spectrum  |

 | Discuss the need and importance of transport in telecommunications. (WECM # 8) | Ch 13 – Wireless - Spectrum, Radios. and antennas Quiz – Ch 12 |
| **14** |

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| Cellular: 2G, 2,5G, 3G, 4G, WiMax,LTE, mobile security |
| Digital Cellular Radio  |
|  Enhanced Data Services  |
| Broadband Wireless  |
| 3G Standards: UMTS, TD-SCDMA, CDMA Solutions  |

 | Describe signaling and its importance to telecommunications. (WECM #5,#6,#7)Design a solution to a case study problem and create a presentation describing the results. (WECM #12 | Ch 14 – Cellular Services and StandardsQuiz - Ch 13 |
| **15** |

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| BFWA, WLANs IEEE 802.11a,b,g,n |
| IEEE 802.16, WiMax, WiBro and Mobile-Fi VoWLAN |
| Integration of WLANs and Cellular Networks, RFID Mesh Networks |

 | Name the key telecommunications industry protocols. (WECM #3) | Ch 15 - Wireless Network Architecture Quiz – Ch 14 |
| **16** |

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| Mobile IP,  IP Multimedia Subsystem (IMS), |  |
|  Applications, Mobile Video, Mobile TV, and Content  |  |
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 | Explain how the Internet Protocol is key to convergence. (WECM #10)Explain the impact on human social behavior due to communications mobility. WECM #15) | Ch 16 – Wireless and MobilityComprehensive Final – Chs (1 – 16) |

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