**Network Fundamentals Course Syllabus**

Course Number: 10112G1001

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**Course Description**

Network Fundamentals introduces the architecture, structure, functions, components, and models of the Internet and other computer networks. The course allows students to examine devices, equipment, topologies, communication protocols, and virtual and cloud technologies and to simulate networks in order to explore properties, settings, and capabilities. Routing and switching protocols will be explored as well as various connectivity media. Additional topics include network management, security, and troubleshooting..

**Goals**

Students learn and apply safety concepts, explore career opportunities and requirements, practice the skills needed to succeed in the workplace, develop leadership qualities and take advantage of the opportunities afforded by Career and Technical Student Organizations (CTSOs), and learn and practice essential digital literacy skills.

**Pre-requisites**: Students must complete the IT Fundamentals Course before taking this course

**Fees:** There is a required fee of $40 per year ($20 per semester)

***Foundational Standards***

1. Incorporate safety procedures in handling, operating, and maintaining tools and machinery; handling materials; utilizing personal protective equipment; maintaining a safe work area; and handling hazardous materials and forces.

2. Demonstrate effective workplace and employability skills, including communication, awareness of diversity, positive work ethic, problem-solving, time management, and teamwork.

3. Explore the range of careers available in the field and investigate their educational requirements, and demonstrate job-seeking skills including resume-writing and interviewing.

4. Advocate and practice safe, legal, responsible, and ethical use of information and technology tools specific to the industry pathway.

5. Participate in a Career and Technical Student Organization (CTSO) to increase knowledge and skills and to enhance leadership and teamwork.

6. Use technology to collaborate with peers and/or experts to create digital artifacts that can be published online for a target audience.

7. Formulate new ideas, solve problems, or create products through the design and engineering process by utilizing testing, prototypes, and user feedback

**Content Standards:**

***Networking Concepts***

1. Compare and contrast the functions and applications of common physical and logical network topologies. Examples: mesh, bus, ring, star, hybrid

2. Differentiate among common network infrastructures.

ExamplesWas : LAN, WAN, WLAN, PAN, MAN, CAN, SAN, SDWAN

3. Identify and formulate binary, decimal, and hexadecimal numbers.

4. Compare and contrast the layers of the Open Systems Interconnect (OSI) model and the Transport Control Protocol/Internet Protocol (TCP/IP) model. a. Illustrate encapsulation and decapsulation within layers of a standard network model.

Examples: Ethernet header, Internet protocol (IP) header, transmission control protocol (TCP) header, user datagram protocol (UDP) header, maximum transmission unit (MTU)

5. Compare and contrast the services and applications used to perform basic network operations.

6. Differentiate among network categories, technologies, and topologies.

7. Explain the purpose of routing and switching and their associated technologies and protocols.

Examples: dynamic routing, bandwidth management, virtual local area network (VLAN), spanning tree protocol

8. Summarize the purpose of common TCP/IP protocols.

9. Differentiate between public and private IP addressing schemes.

10. Compare and contrast IPv4 and IPv6 addressing features, methods, and characteristics.

Examples: APIPA, EUI-64, multicast, unicast, anycast, broadcast, link local, loopback, default gateway

11. Categorize classful addresses according to specific network use.

12. Interpret classless inter-domain routing (CIDR) notation (subnetting).

***Networking Hardware***

13. Explain the functions and applications of common networking devices.

Examples: router, bridge, switch, hub, firewall, access point, content filter, modem

14. Compare and contrast common local area network (LAN) and wide area network (WAN) connection types.

Examples: copper twisted pair, coaxial, fiber-optic, wireless, synchronous optical network (SONET)

15. Identify common network connectors.

Examples: RJ-45, LC, SC, ST, MT-RJ, F-type

16. Demonstrate the use of common networking tools in a given scenario.

Examples: RJ-45 crimping tool, cable tester, tone probe, punchdown tool

17. Differentiate among common network wiring termination standards.

Examples: EIA/TIA 568A, EIA/TIA 568B

18. Identify transceivers and media converters and explain their uses.

Examples: SFP, SFP+, QSFP, QSFP+

19. Compare and contrast copper and fiber Ethernet standards. Examples: 10BASE-T, 100BASE-TX, 1000BASE-T, 10GBASE-T, 40GBASE-T, 100BASE-FX, 100BASE-SX, 1000BASE-SX, 10GBASE-SR, 10GBASE-LR, CWDM, DWDM, WDM

20. Differentiate among virtualization and network storage technologies

***Network Management***

21. Interpret and explain technical network documents and text.

22. Interpret network documentation and diagrams.

23. Compare and contrast business continuity and disaster recovery concepts based on current industry practices.

Examples: policies, procedures

24. Explain common scanning, monitoring, and patching processes and summarize their expected outputs.

***Wireless Networking***

25. Compare and contrast media access control techniques used in networks.

26. Configure a router with basic settings.

27. Differentiate among common wireless communication methods.

Examples: infrared, radio waves, satellite, microwave

28. Describe wireless networking industry standards.

Examples: IEEE 802.11ac, 802.11ax

***Network Security***

29. Explain common security concepts.

Examples: awareness, risk assessment, ethics

30. Compare and contrast common types of attacks.

Examples: malware, phishing, SQL injection attack, cross-site scripting (XSS), denial of service (DoS), session hijacking, man-in-the-middle attacks

31. Apply network hardening techniques in a given scenario.

Examples: reduce attack surface, limit access, change passwords frequently, patch management

32. Analyze remote access methods and associated security consequences.

Examples: site-to-site VPN, virtual network computing (VNC), remote desktop connection

33. Identify risks and vulnerabilities related to physical security within a network.

Examples: personnel access and risks, hardware access, data access and availability a. Investigate and report on current best practices for mitigating physical security threats to the network.

***Network Troubleshooting***

34. Utilize common network troubleshooting methodologies to resolve issues within a network in a given scenario.

35. Utilize network software tools and commands to troubleshoot network issues.

Examples: ping, netstat, arp, nbtstat, hostname, tracert, ipconfig, ifconfig, nslookup 36. Troubleshoot common wireless connectivity issues.

*In addition, this course will help prepare the student to pursue the TestOut PC Pro and CompTIA A+ certification exams.*

**Embedded Numeracy Anchor Assignment**

This course contains mathematical problems for some units. Students will have to add the volume of hard drive space from ones, tens, hundreds, thousands, or millions. They will also have to know the speed of a computer and convert in Megahertz and Gigahertz.

**Embedded Literacy Anchor Assignment**

Students will read and comprehend complex informational texts used to explain hardware, software, processes, and basic computer components. Students will be shown an example of simulation labs and will be tasks to complete each task in order.

**Embedded Science Anchor Assignment**

This course contains graphs and charts. Students will Use Microsoft Excel tables and charts to analyze data. Format cells as a table with total rows. Sort table columns to better interpret data. Use Excel charts to display aggregate data. Modify Excel chart settings to better interpret data. Analyze data using Microsoft Access reports. Open an Access report based on a sales query. Interpret Access reports

**Classroom Expectations**

1. Be respectful of the teacher, each other, and all classroom property
2. Participate in classroom discussion and group work
3. Use appropriate language at all times
4. Be in class on time and seated
5. No Phone usage
6. Keep your chair at your laptop unless you have permission to move

**Daily Class Work**

Students will review previous class work and get more in depth to the information technology cluster.

**Assessment Procedures:** Final grades will be comprised of daily activities, quizzes, and tests

Major (50%): Units tests and Simulators Labs

Minor (40%): Daily activities and quizzes

9th Weeks Exam (10%)

**Grading Policy**

A (90-100), B (80-89), C (70-79), D (60-69), and F (below 60).

# Student Credentialing

Students will have the opportunity to take the TestOut PC Pro test for credential. Students that consistently make more than 90 on the practice exams will test of credential. My goal is for every student to get the opportunity to get a credential. If any student does excellent on this test, we will provide them the opportunity to take the CompTIA A+ test at no cost to the student. Credential options may change any time under guidance from the state department of education and testing eligibility will update accordingly.

**CTSO**: SkillsUSA empowers its members to become world-class workers, leaders and responsible American citizens. SkillsUSA improves the quality of our nation’s future skilled workforce through the development of Framework skills that include personal, workplace and technical skills grounded in academics. Alabama SkillsUSA is committed to producing a generation of strong workers and exceptional leaders who will take America’s workforce into a new frontier of triumph and prosperity.

Print Student Name\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Student Signature\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Parent or Guardian Signature\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Date\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

*\* The syllabus serves as a guide for both the teacher and student; however, during the term it may become necessary to make additions, deletions, or substitutions. For any necessary changes, adequate notice will be provided to the students.*