

Professional Technical Studies: Information Technology Cluster
Network Systems Pathway

Strand:

PT-NWS1

Identifying and Analyzing Customer/Organization Network System Needs and Requirements

Students analyze needs and requirements.

Standard:

PT-NWS1a: The student will gather data to identify customer/organization requirements so as to:

Components:

- PT-NWS1a.1:** identify system and network requirements;
- PT-NWS1a.2:** identify physical requirements for system implementation;
- PT-NWS1a.3:** identify system requirements for various types of installations;
- PT-NWS1a.4:** identify environmental requirements, conditions, and limitations;
- PT-NWS1a.5:** identify input and output requirements;
- PT-NWS1a.6:** identify system processing requirements;
- PT-NWS1a.7:** identify functional requirements for hardware, networking, and software system; and
- PT-NWS1a.8:** identify time, technology, and resource constraints.

Standard:

PT-NWS1b: The student will conduct needs analysis so as to:

Components:

- PT-NWS1b.1:** analyze existing procedures;
- PT-NWS1b.2:** define business problem to be solved by the application; and
- PT-NWS1b.3:** access needed information using company and manufacturers' references (e.g., procedural manuals, documentation, standards, and work flowcharts).

Standard:

PT-NWS1c: The student will develop networking requirements specification so as to:

Components:

- PT-NWS1c.1:** demonstrate knowledge of the use, structure, and contents of a requirements specification document;
- PT-NWS1c.2:** define system and software requirements;
- PT-NWS1c.3:** evaluate installation requirements;
- PT-NWS1c.4:** resolve conflicting requirements; and
- PT-NWS1c.5:** develop informal specifications.

Standard:

PT-NWS1d: The student will analyze requirements/specifications using current approaches so as to:

Components:

- PT-NWS1d.1:** demonstrate knowledge of how to use software methodologies to analyze a real-world problem; and
- PT-NWS1d.2:** identify constraints.

Strand:

PT-NWS2

Project Management

Students manage project tasks, timelines, and goals.

Standard:

PT-NWS2a: The student will produce strategies and plan to solve the specific network problem so as to:

Components:

- PT-NWS2a.1:** evaluate project requirements;

	PT-NWS2a.2: demonstrate knowledge of the key functions and subsystems of the network system; and
	PT-NWS2a.3: demonstrate knowledge of the system life-cycle approach.
Standard:	PT-NWS2b: The student will create project plan so as to:
Components:	PT-NWS2b.1: prepare overall plan for integrating new processes, protocols, and equipment;
	PT-NWS2b.2: estimate time requirements;
	PT-NWS2b.3: identify tools and resources for the job;
	PT-NWS2b.4: identify and evaluate risks;
	PT-NWS2b.5: identify critical milestones; and
	PT-NWS2b.6: identify interdependencies.
Standard:	PT-NWS2c: The student will manage information system project methodologies so as to:
Components:	PT-NWS2c.1: define the scope of the project;
	PT-NWS2c.2: develop task list (i.e., work breakdown structures);
	PT-NWS2c.3: evaluate project requirements and risks;
	PT-NWS2c.4: identify stakeholders and decision makers;
	PT-NWS2c.5: identify required resources and budgets;
	PT-NWS2c.6: identify and track critical milestones; and
	PT-NWS2c.7: develop a method of evaluation.
Strand:	
PT-NWS3	Quality Assurance Processes Students use a systematic approach to provide evidence that products satisfy requirements.
Standard:	PT-NWS3a: The student will evaluate the correctness and effectiveness of implementing the network system so as to:
Components:	PT-NWS3a.1: evaluate whether the process was applied in an efficient and responsible manner; and
	PT-NWS3a.2: determine needed follow-up actions.
Standard:	PT-NWS3b: The student will analyze network security systems so as to:
Components:	PT-NWS3b.1: identify security requirements and the need for data protection;
	PT-NWS3b.2: identify specific access levels that need to be accommodated;
	PT-NWS3b.3: match security system design to identified security requirements; and
	PT-NWS3b.4: develop security plan.
Strand:	
PT-NWS4	Networking Concepts Processes Students design computer networks.
Standard:	PT-NWS4a: The student will demonstrate knowledge of the basics of network architecture so as to:
Components:	PT-NWS4a.1: demonstrate knowledge of the characteristics and uses of network components (e.g., hub, switches, routers, firewall);
	PT-NWS4a.2: differentiate between a physical and logical topology;

	<p>PT-NWS4a.3: demonstrate a basic knowledge of OSI modeling;</p> <p>PT-NWS4a.4: demonstrate knowledge of LAN transmission methods and standards;</p> <p>PT-NWS4a.5: demonstrate knowledge of LAN transmission protocols;</p> <p>PT-NWS4a.6: demonstrate knowledge of various frame types and formats; and</p> <p>PT-NWS4a.7: differentiate processes, services, and protocol.</p>
Standard:	<p>PT-NWS4b: The student will demonstrate knowledge of basic network classifications and topologies so as to:</p>
Components:	<p>PT-NWS4b.1: differentiate between LANs, MANs, and WANs;</p> <p>PT-NWS4b.2: identify the basic point-to-point network topologies (e.g., star, ring, tree, network, and irregular);</p> <p>PT-NWS4b.3: demonstrate knowledge of packet-switching techniques;</p> <p>PT-NWS4b.4: identify basic broadcast topologies (e.g., star, ring, bus);</p> <p>PT-NWS4b.5: demonstrate knowledge of characteristics of connection-oriented and connectionless networks;</p> <p>PT-NWS4b.6: demonstrate knowledge of basic telephony (analog vs. digital signals);</p> <p>PT-NWS4b.7: demonstrate knowledge of how to turn LANs into MANs and WANs;</p> <p>PT-NWS4b.8: identify standard high-speed networks;</p> <p>PT-NWS4b.9: demonstrate knowledge/usage of electronic communication networks; and</p> <p>PT-NWS4b.10: investigate emerging technologies.</p>
Standard:	<p>PT-NWS4c: The student will demonstrate knowledge of LAN physical media so as to:</p>
Components:	<p>PT-NWS4c.1: demonstrate knowledge of the reasons for installing a network;</p> <p>PT-NWS4c.2: demonstrate knowledge of local area network (LAN) trends and issues;</p> <p>PT-NWS4c.3: trace the evolution of networks; and</p> <p>PT-NWS4c.4: analyze current trends and development in LANs.</p>
Standard:	<p>PT-NWS4d: The student will demonstrate knowledge of common network computing platforms so as to:</p>
Components:	<p>PT-NWS4d.1: identify how components of a network operating system (server, platform, network services software, network redirection software, communications software) support network operations; and</p> <p>PT-NWS4d.2: select a LAN/WAN technology that meets user-defined set of requirements.</p>
Standard:	<p>PT-NWS4e: The student will demonstrate knowledge of network connectivity basis and transmission line applications so as to:</p>
Components:	<p>PT-NWS4e.1: demonstrate knowledge of the principles and operation of wire (coaxial, fiber optics, etc.) and wireless systems; and</p> <p>PT-NWS4e.2: demonstrate knowledge of the principles and operation of fiber optics, analog and digital circuits.</p>

Standard:	PT-NWS4f:	The student will demonstrate knowledge of communication standards for networks so as to:
Components:	PT-NWS4f.1:	demonstrate knowledge of the TCP/IP protocol;
	PT-NWS4f.2:	demonstrate knowledge of open-system interconnection (OSI) standard and ISO standard 7498; and
	PT-NWS4f.3:	identify standard high-speed networks.
Standard:	PT-NWS4g:	The student will demonstrate knowledge of network operating systems so as to:
Component:	PT-NWS4g.1:	demonstrate knowledge of the general characteristics of network operating systems.
Standard:	PT-NWS4h:	The student will demonstrate knowledge of WAN systems so as to:
Components:	PT-NWS4h.1:	demonstrate knowledge of the conversion of analog speech to digital;
	PT-NWS4h.2:	relate voice, data concepts, and video-to-video area networks;
	PT-NWS4h.3:	select primary and backup data circuits;
	PT-NWS4h.4:	evaluate analog and digital transmission for cost, performance, and reliability;
	PT-NWS4h.5:	demonstrate knowledge of firewall between trusted network and WAN;
	PT-NWS4h.6:	establish a Virtual Private Network (VPN) to form the infrastructure of the WAN;
	PT-NWS4h.7:	determine routers needed to connect with LAN; and
	PT-NWS4h.8:	demonstrate knowledge of interconnecting LANs using WAN services.
Standard:	PT-NWS4i:	The student will demonstrate knowledge of network security systems so as to:
Components:	PT-NWS4i.1:	demonstrate knowledge of security requirements and the need for data protection;
	PT-NWS4i.2:	demonstrate knowledge of access levels that need to be accommodated; and
	PT-NWS4i.3:	develop security plan.
Strand:	PT-NWS5	Network Installation and Configuration Students install and configure computer networks.
Standard:	PT-NWS5a:	The student will install and configure computer networks so as to:
Components:	PT-NWS5a.1:	install information system application programs in accordance with requirements;
	PT-NWS5a.2:	install appropriate operating system and telecommunications hardware and software;
	PT-NWS5a.3:	operate server applications;
	PT-NWS5a.4:	load end-user software and configure appropriately;

PT-NWS5a.5: ensure that all multiuser aspects of the application function are operational; and

PT-NWS5a.6: resolve software compatibility issues.

Strand:

PT-NWS6

Network Administration and Monitoring

Students administer computer networks.

Standard:

PT-NWS6a: The student will demonstrate knowledge of disaster recovery and business continuance so as to:

Components:

PT-NWS6a.1: identify methods for avoiding common computer system disasters;

PT-NWS6a.2: identify common backup devices;

PT-NWS6a.3: identify the criteria for selecting a backup system;

PT-NWS6a.4: back up system;

PT-NWS6a.5: restore system; and

PT-NWS6a.6: compare/contrast streaming a file-backup system.

Strand:

PT-NWS7

Network Maintenance and User Support Services

Students maintain computer networks and provide customer support.

Standard:

PT-NWS7a: The student will identify technical support needed so as to:

Components:

PT-NWS7a.1: apply information and data analysis techniques;

PT-NWS7a.2: identify skill-level needs; and

PT-NWS7a.3: identify resources and risks.

Standard:

PT-NWS7b: The student will perform technical support needed so as to:

Component:

PT-NWS7b.1: employ technical and computer tools to perform task in the most cost-effective manner.

Standard:

PT-NWS7c: The student will perform software upgrades and fixes so as to:

Component:

PT-NWS7c.1: analyze operational problems.

Standard:

PT-NWS7d: The student will perform standard computer backup procedures so as to:

Components:

PT-NWS7d.1: recognize the need for regular backup procedures;

PT-NWS7d.2: develop backup process;

PT-NWS7d.3: identify battery backup equipment; and

PT-NWS7d.4: install surge-suppression protection.

Standard:

PT-NWS7e: The student will perform network system maintenance so as to:

Components:

PT-NWS7e.1: demonstrate knowledge of the basic elements of network maintenance;

PT-NWS7e.2: identify available diagnostic tools used for system maintenance;

PT-NWS7e.3: identify maintenance procedures and processes;

PT-NWS7e.4: identify problems using diagnostic tools;

PT-NWS7e.5: document network system malfunction(s);

PT-NWS7e.6: perform preventive maintenance procedures on computer and peripheral devices;

PT-NWS7e.7: identify new or replacement networking components needed;

PT-NWS7e.8: respond to system messages;

PT-NWS7e.9: fix recoverable problems;

PT-NWS7e.10: restore systems;

PT-NWS7e.11: identify maintenance procedures and processes;

PT-NWS7e.12: establish a preventive maintenance plan;

PT-NWS7e.13: use a systems approach to analyze system problems, select solutions, test solutions, and implement accurate solution;

PT-NWS7e.14 create maintenance plan for regular integrity checks; and

PT-NWS7e.15: minimize impact of problems on productivity.

Standard:

PT-NWS7f: The student will troubleshoot problems so as to:

Components:

PT-NWS7f.1: demonstrate knowledge of basic troubleshooting steps;

PT-NWS7f.2: identify available diagnostic tools used for system maintenance;

PT-NWS7f.3: perform appropriate analysis to identify cause of the problem;

PT-NWS7f.4: develop a problem-resolution plan; and

PT-NWS7f.5: document results and solutions.

Standard:

PT-NWS7g: The student will troubleshoot data communications so as to:

Components:

PT-NWS7g.1: isolate system faults in various types of networks, cables, data modems, and carrier systems;

PT-NWS7g.2: determine hardware communication faults using diagnostic tools; and

PT-NWS7g.3: identify network problems using network management tools (e.g., hardware, software carriers).

Strand:

PT-NWS8

Safety

Students understand the importance of safety and regulatory compliance in the workplace.

Standard:

PT-NWS8a: The student will apply safety practices in the laboratory so as to:

Components:

PT-NWS8a.1: develop and implement a safety checklist;

PT-NWS8a.2: use safety equipment in the laboratory; and

PT-NWS8a.5: encourage others to employ safety practices.