Course Description

CNT4603 | System Administration and Maintenance | 4.00 credits

This upper division course, for students majoring in Information Systems Technology, explores UNIX and Microsoft Windows systems and their administration and maintenance within the network setting. Students will learn how to install, maintain, and extend multi-user computer systems and how to develop administrative policies and procedures. Students will also learn how to apply troubleshooting and problem-solving skills to resolve user and system issues. Prerequisite: CTS1134 or 1650.

Course Competencies:

Competency 1: The student will install servers by:

1. Examining physical requirements necessary for installing servers
2. Creating an installation document and implementation timeline
3. Installing network cabling and terminating each connection in conjunction with cabling standards
4. Setting up equipment rack(s) with routers, switches, and other necessary hardware
5. Acquiring and installing uninterruptible power supply (UPS) back-up and appropriate hardware-software based-redundant array of independent disks (RAID) strategy
6. Test each step as installed and create/use a comprehensive test strategy when completed
7. Ensuring the proper disposal of hardware

Competency 2: The student will configure servers by:

1. Installing server operating systems
2. Implementing local area network (LAN) / vast area network (WAN) technologies according to desired network plan
3. Configuring services provided by servers (applications, web, communications, email, printing, faxing, and files) efficiently
4. Configuring servers for top performance, including reviewing bandwidth usage and anticipated volumes based on expected network traffic
5. Setting up a printing plan to maximize the printing needs of users efficiently
6. Determining the best way to segment the network and balance the workload as efficiently as possible
7. Implementing security policy for computers, users, groups, and authentication
8. Devising a plan for incorporating new processes, protocols, and equipment into existing server systems

Competency 3: The student will troubleshoot server problems by:

1. Determining potential hardware compatibility issues and being familiar with commonly used network utilities to troubleshoot connection issues
2. Examining common server bottlenecks, such as memory allocation problems, file lock settings, and resource availability
3. Troubleshooting servers, workstations, and other devices
4. Examining the steps to be taken to identify and resolve cabling issues
5. Creating test case plans for troubleshooting anticipated server problems
6. Reviewing server error logs regularly
7. Documenting all errors as they are identified and evaluating problem resolution to ensure optimal solution(s) are implemented

Competency 4: The student will manage the server and implement server solutions by:

1. Reviewing and analyzing threats to the server(s) and installing critical software updates that resolve known security vulnerabilities and other stability issues
2. Ensuring that resources are being shared efficiently through rights and permissions
3. Performing audits on software license agreements

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4. Resolving common server problems
5. Performing preventative maintenance on servers and ancillary devices using diagnostic tools to keep the network in optimal shape
6. Setting up remote connectivity for key personnel as needed
7. Verifying that the Domain Name System (DNS) is optimized to improve network communication and service
8. Documenting all errors and implementing an error log to ensure all errors can be tracked
9. Reviewing bandwidth usage to ensure that projected volumes can be processed efficiently

Competency 5: The student will perform back-up and recovery by:
1. Restoring the LAN operating systems as necessary
2. Explaining the purpose of a network disaster recovery plan
3. Identifying the key decisions in choosing a backup system
4. Research backup systems to meet specified requirements
5. Comparing and contrasting alternatives for backing up data and restoring a network from a backup system
6. Implementing a comprehensive plan to establish backup procedures according to a pre-determined schedule
7. Configuring a shadow copy
8. Using the built-in functionality of a server operating system to prevent a disaster and/or recover from a disaster
9. Ensuring the proper disposal of hardware

Competency 6: The student will perform system preventative maintenance (PM) by:
1. Defining key areas where significant network problems might occur (memory allocation, resource availability, and hardware conflict)
2. Creating a preventative maintenance log with a specific event schedule
3. Reviewing server error logs and performing preventative maintenance to reduce the chances of those errors recurring on the network
4. Using visual indicators and diagnostic utilities to interpret server and network problems and performing maintenance as needed
5. Evaluating the steps necessary to perform preventative maintenance for a cabling or infrastructure problem in a logical format, step one, step two, step three
6. Optimizing the DNS

Competency 7: The student will evaluate and implement security solutions for the network by:
1. Researching evolving security solutions for enterprise networks
2. Designing security solutions for servers, computers, accounts, and authentication in an enterprise network
3. Implementing security controls such as Firewalls, Access Control Lists (ACL), Mandatory Access Control (MAC), or Discretionary Access Control (DAC) to ensure user policies are enabled
4. Managing and implementing critical software updates that resolve known security vulnerabilities, secure network access, and assure network stability
5. Verifying that security procedures are deployed and are actively used and documented
6. Installing, configuring, and monitoring an intrusion detection system (IDS) and describing how the IDS functions
7. Interpreting security logs to ensure adherence to established security standards to detect errors, intrusions, and vulnerabilities
8. Preparing the correct response required for a given security issue
9. Examining security features in software programs and network operating systems

Competency 8: The student will create a sustainable knowledge base for the enterprise network by:
1. Documenting the network configuration and infrastructure
2. Maintaining and interpreting an error tracking log that includes documenting all errors encountered and actions taken to resolve those errors
3. Performing a network baseline, including the testing and reporting of the physical connectivity, network utilization, protocol usage, peak network utilization, and throughput of the network

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4. Performing an audit of all hardware and software used on the network
5. Monitoring the volume and bandwidth used on the network during regular and peak time periods and documenting the results, including performance issues encountered

Competency 9: The student will integrate virtualized resources and network storage capacity in an enterprise network by:
1. Examining the benefits and common implementation strategies for virtualization in use today
2. Examining the concept and implementation of network storage resources
3. Examining storage networking protocols, including Fibre Channel and iSCSI
4. Selecting network areas that would benefit by virtualization
5. Installing, configuring, and maintaining virtualized server software operating systems for use with client operating systems in virtual machines
6. Creating virtual drives with multiple operating systems.
7. Installing, configuring, troubleshooting, and maintaining shared network storage resources
8. Maintaining virtualized systems and troubleshooting system errors with virtualization tools
9. Performing audits and maintaining documentation of virtualized resources

Learning Outcomes:
- Use quantitative analytical skills to evaluate and process numerical data
- Solve problems using critical and creative thinking and scientific reasoning
- Use computer and emerging technologies effectively