Washtenaw Community College Comprehensive Report

CNT 211 Installation, Storage, and Compute - Windows Server 2016
Effective Term: Spring/Summer 2018

Course Cover

Division: Business and Computer Technologies
Department: Computer Instruction
Discipline: Computer Networking Technology
Course Number: 211
Org Number: 13400
Full Course Title: Installation, Storage, and Compute - Windows Server 2016
Transcript Title: Install/Stor Win Server 2016
Is Consultation with other department(s) required: No
Publish in the Following: College Catalog , Time Schedule , Web Page
Reason for Submission: Course Change
Change Information:
Consultation with all departments affected by this course is required.
Course title
Course description
Pre-requisite, co-requisite, or enrollment restrictions
Outcomes/Assessment
Objectives/Evaluation
Rationale: The three Microsoft MCSA Certifications have totally changed for the 2016 version of Windows Server. The emphasis with this first certification (which CNT211 aligns to) is now Installation, Storage and Maintenance in contrast to the Windows Server 2012 version which covered topics that have now been moved to the other two certifications. Also, a considerable number of new features have been added, resulting in additional material to incorporate into this version of the course.
Proposed Start Semester: Spring/Summer 2018
Course Description: This course is part of a series of courses that provides the skills and knowledge necessary to work in a Windows Server 2016 environment and lays a foundation for the first Windows Server 2016 MCSA certification. Topics include the installation options for Server 2016 including graphical, server core, Nano server, and server containers. Also, methods of handling installations, including imaging and various image deployment options are covered. Storage features such as RAID, storage spaces, ISCSI, and fail-over clustering are implemented with both physical and virtual disks. Server maintenance including backups, WSUS, VM migration and replicas, network load balancing and permissions are incorporated. The title of this course was previously Installing and Configuring Windows Server 2012.

Course Credit Hours

Variable hours: No
Credits: 4
Lecture Hours: Instructor: 60 **Student:** 60
Lab: Instructor: 0 **Student:** 0
Clinical: Instructor: 0 **Student:** 0

Total Contact Hours: Instructor: 60 **Student:** 60
Repeatable for Credit: NO
Grading Methods: Letter Grades

Audit
Are lectures, labs, or clinicals offered as separate sections?: NO (same sections)

College-Level Reading and Writing
College-level Reading & Writing

College-Level Math
No Level Required

Requisites

General Education
General Education Area 7 - Computer and Information Literacy
Assoc in Arts - Comp Lit
Assoc in Applied Sci - Comp Lit
Assoc in Science - Comp Lit

Request Course Transfer
Proposed For:
Eastern Michigan University

Student Learning Outcomes

1. Identify the Windows Server editions, the types of installations, including the techniques for configuring the graphical version, Server Core, Nano Server, and Window Server Containers using virtualization techniques within Hyper-V, performing installations over the network and performing subsequent post-installation tasks using the command line and PowerShell.
   Assessment 1
   Assessment Tool: Written exam specifically created for the assessment
   Assessment Date: Fall 2020
   Assessment Cycle: Every Three Years
   Course section(s)/other population: All course sections
   Number students to be assessed: All students
   How the assessment will be scored: Rubric: A written test will be given that addresses both the outcomes and objectives listed in the syllabus. This test will be divided into sections, each identified with an outcome, and the questions in each section will address the objectives.
   Standard of success to be used for this assessment: Average of all students taking the test should equal or exceed 70% correct answers for all questions used in the assessment test. 70% or greater of the number of students taking the assessment test should equal or exceed that 70% mark for all the questions used in the assessment test. Outcome success: average of all student scores for each particular outcome's part of the test equals or exceeds 70%.
   Who will score and analyze the data: All departmental instructors who teach sections of this course

2. Identify the principles related to installing various storage solutions including implementing various forms of RAID, (0,1,3), storage spaces with thin provisioning, and iSCSI fault tolerant storage with simultaneous access from multiple servers.
   Assessment 1
   Assessment Tool: Written exam specifically created for the assessment
   Assessment Date: Fall 2020
   Assessment Cycle: Every Three Years

Course section(s)/other population: All course sections
Number students to be assessed: All students
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3. Recognize and identify the various implementations of server and client image preparation and deployment, including the use of the DISM and SysPrep Tools, plus implementing Windows Deployment Services in an Active Directory environment.

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Assessment Cycle: Every Three Years
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Number students to be assessed: All students
How the assessment will be scored: Rubric: A written test will be given that addresses both the outcomes and objectives listed in the syllabus. This test will be divided into sections, each identified with an outcome, and the questions in each section will address the objectives.
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4. Recognize and identify fault tolerant and load balancing solutions, including fail-over clustering with a separate iSCSI network, Network Load Balancing using web servers, and Hyper-V Migration and Replicas transferring live virtual machines between hosts.

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Assessment Date: Fall 2020
Assessment Cycle: Every Three Years
Course section(s)/other population: All course sections
Number students to be assessed: All students
How the assessment will be scored: Rubric: A written test will be given that addresses both the outcomes and objectives listed in the syllabus. This test will be divided into sections, each identified with an outcome, and the questions in each section will address the objectives.
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5. Identify and configure maintenance and security implementations including Windows backup, Windows Server Update Services (WSUS), data deduplication, and permissions including NTFS Security as well as share permissions.

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Course section(s)/other population: All course sections
Number students to be assessed: All students
How the assessment will be scored: Rubric: A written test will be given that addresses both the outcomes and objectives listed in the syllabus. This test will be divided into sections, each identified with an outcome, and the questions in each section will address the objectives.
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Course Objectives

1. Identify the various methods of Server 2016 installations including stand-alone, over the network, etc., and the initial configuration of a Server installation including naming, addressing, and other important settings.
2. Identify server virtualization techniques including installation of various editions (Server Core and Nano Server) of Server 2016 and Windows 10 in a virtual machine, and identify the tools necessary for management of these operating systems remotely and with PowerShell.
3. Identify the various editions of Server 2016, including their suggested uses, their price structure, types of licenses/activation techniques and the various options and components associated with each one.
4. Define the methods for creating Windows Operating System Containers, including the Server Core OS and the Web Server OS using the Docker tools, and the methods for the configuration and testing of these systems.
5. Identify the components associated with virtual networking, including the three main types of virtual networks, the creation of multiple virtual networks of each type, virtual switch components including MAC and IP addressing, and V-LANs.
6. Identify the different forms of basic RAID used with Windows Server 2016, including Raid 0 - stripping, Raid 1 - mirroring, Raid 5 - stripping with parity, and testing each form using actual disk failures.
7. Create and configure thin provisioning with Windows Server storage space implementations including creating large virtual disks made up of a number of small physical disks, testing of fault-tolerance, hot swapping of disks and disk recovery.
8. Identify the methods for creating an iSCSI storage solution on a separate high speed network, using a Virtual Server 2016 iSCSI target, and two physical Server 2016 iSCSI initiators and implement a solution for multiple simultaneous access to the target.
9. Differentiate various methods of disk configurations, including converting VHDX to VHD virtual disks and vice-versa, mounting virtual disks as physical disks to make changes in them, and booting natively, virtual operating systems from virtual disks.
10. Identify the steps in preparing Windows 10 and Server 2016 images including using the Command Line for combining partitions, and running the SysPrep tool for setting operating system uniqueness for an "out of the box" experience.
11. Distinguish the various steps in capturing and deploying images with the DISM (Deployment Image Servicing and Management) Tool, including using remote network locations, external media, and

options for verification.

12. Distinguish the tools used for unattended installations including preparing an XML answer file with the WSIM (Windows System Image Manager) tool and the networking tools, WOL (Wake-on-Lan) and PXE (Preexecution Environment).
13. Identify how modularization is used for creating the various versions of Windows Server 2016 from a single image file using a base image and adding modules to it for the various versions.
14. Define the various components of using Windows Deployment Services for automatic unattended deployment of operating systems including the use of Active Directory, a DNS and DHCP Server, a Windows Deployment Server, and a Network card supporting WOL and PXE.
15. Demonstrate using fail-over clustering with a separate internal network having an iSCSi Target including the incorporation of two servers with testing performed to insure proper switch over.
16. Recognize and identify the various forms of Virtual Server Migration and where each would be used, including live migration from one physical host to another, quick migration, and storage migration.
17. Recognize and identify the forms of Virtual Server Replication from one physical host to another for fault tolerance, including the three different types - planned failover, unplanned failover, and test failover.
18. Distinguish the various steps in creation and configuration of the Server 2016 Network Load Balancing feature with two separate physically identical web servers including using the NLB Tool for convergence and a client workstation for testing.
19. Define and differentiate Windows Server 2016 security permissions including local NTFS security permissions, network share permissions, and the interaction between the two plus identify file and folder ownership characteristics.
20. Identify the various uses for Windows Server 2016 Backup tool, including doing data, system component, and complete operating system backups and restores to/from internal, external, and network-based storage devices.
21. Identify the steps required to implement the Windows Server Update Services (WSUS) utility including the use of upstream and downstream servers, configuration of appropriate group policy settings, and actual methods of testing with Windows Client machines.
22. Identify the uses of the data deduplication tool to eliminate redundant data throughout disk storage structures to save disk space, including the appropriate testing to measure the effect of its implementation as well as determining the actual location of the sole data copy.

New Resources for Course

Projector for Lectures, Classroom Computers for Projects

Course Textbooks/Resources

Textbooks

Zacker, Craig. *Installation, Storage, and Compute Windows Server 2016*, 1st ed. Microsoft, 2017, ISBN: 0-7356-9882-1.

Manuals

Reichert. CNT211 Installation, Storage, and Computer for Windows Server 2016, Xandu Publishing, 10-15-2017

Periodicals

Software

Equipment/Facilities

Level III classroom
Computer workstations/lab
Data projector/computer

Reviewer	Action	Date
Faculty Preparer:		
William Reichert	*Faculty Preparer*	*Aug 25, 2017*
Department Chair/Area Director:		
Philip Geyer	*Recommend Approval*	*Sep 18, 2017*
Dean:		
Eva Samulski	*Recommend Approval*	*Sep 19, 2017*
Curriculum Committee Chair:		
Lisa Veasey	*Recommend Approval*	*Nov 28, 2017*
Assessment Committee Chair:		
Michelle Garey	*Recommend Approval*	*Nov 29, 2017*
Vice President for Instruction:		
Kimberly Hurns	*Approve*	*Dec 02, 2017*