

CIS 055: SYSTEMS AND NETWORK ADMINISTRATION

Originator

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Justification / Rationale

Aligned effective term in CIM with Colleague

Effective Term

Fall 2023

Credit Status

Credit - Degree Applicable

Subject

CIS - Computer Information Systems

Course Number

055

Full Course Title

Systems and Network Administration

Short Title

SYSTEM/NETWORK ADMIN

Discipline**Disciplines List**

Computer Information Systems (Computer network installation, microcomputer technology, computer applications)

Modality

Face-to-Face

100% Online

Hybrid

Catalog Description

This course will provide a student with the knowledge and skills at the administrator level to be able to do the job in any environment. The course covers essential hardware and software technologies of on-premise and hybrid server environments including high availability, cloud computing, and scripting. The course includes performance-based questions that require the candidate to demonstrate multi-step knowledge to securely deploy, administer and troubleshoot servers.

This course requires the student to build, maintain, troubleshoot and support server hardware and software technologies. The student will be able to identify environmental issues; understand and comply with disaster recovery and physical/software security procedures; become familiar with industry terminology and concepts; understand server roles/specializations and interaction within the overall computing environment. This course will prepare students to take the current version of CompTIA's Server+ Certification exam. C-ID: ITIS 155

Schedule Description

This course will provide a student with the knowledge and skills required to install and maintain physical hardware and storage. Manage and maintain servers, including OS (Operating System) configuration, access control, and virtualization. Apply physical and network data security techniques and understand disaster recovery and implement backup techniques. Diagnose and resolve system hardware, software, connectivity, storage, and security issues.

This course will prepare students to take the current version of CompTIA's Server+ Certification exam.

Prerequisite: CIS-053 Computer Networks and Security

Lecture Units

2

Lecture Semester Hours

36

Lab Units

1

Lab Semester Hours

54

In-class Hours

90

Out-of-class Hours

72

Total Course Units

3

Total Semester Hours

162

Class Size Maximum

35

Prerequisite Course(s)

CIS 053

Required Text and Other Instructional Materials**Resource Type**

Book (Recommended)

Author

TestOut

Title

Server Pro: Install and Storage

Edition

V4

Publisher

TestOut

Year

2022

Entrance Skills

Know the OSI (Open System Interconnection) Model

Requisite Course Objectives

CIS 053-Explain devices, applications, protocols, and services at their appropriate OSI (Open System Interconnection) layers. (Networking Concepts)

Entrance Skills

Show Proficiency in IP Addressing

Requisite Course Objectives

CIS 053-Given a scenario, configure the appropriate IP (Internet Protocol) addressing components. (Networking Concepts)

Entrance Skills

Understand the different networking media.

Requisite Course Objectives

CIS 053-Explain the concepts and characteristics of routing and switching. (Networking Concepts)

Entrance Skills

Understand WI-FI technology

Requisite Course Objectives

CIS 053-Given a scenario, implement the appropriate wireless technologies and configurations. (Networking Concepts)

Entrance Skills

Have knowledge of Cloud Technology

Requisite Course Objectives

CIS 053-Summarize cloud concepts and their purposes. (Networking Concepts)

Entrance Skills

Show proficiency in networking fundamentals and terminology.

Requisite Course Objectives

CIS 053-Given a scenario, determine the appropriate placement of networking devices on a network and install/configure them. (Infrastructure)

Entrance Skills

Demonstrate WI-FI Troubleshooting

Requisite Course Objectives

CIS 053-Given a scenario, troubleshoot common wireless connectivity and performance issues. (Network Troubleshooting & Tools)

Entrance Skills

Show proficiency in IP Addressing, routing fundamentals, and subnets.

Requisite Course Objectives

CIS 053-Given a scenario, troubleshoot common network service issues. (Network Troubleshooting & Tools)

Course Content

Chapter 1: INTRODUCTION

- Windows as a Server
- Windows Server 2012 Interface Overview
- Windows Server 2016 Interface Overview

Chapter 2: SERVER INSTALLATION

- Server 2012 Installation
- Server 2016 Installation
- Server Upgrade and Migration

Chapter 3: SERVER CONFIGURATION AND MANAGEMENT

- PowerShell
- Server Roles
- Server Core Deployment
- Remote Server Management
- Image Servicing
- Nano Server Deployment

Chapter 4: NETWORKING

- IPv4 Addressing
- IPv6 Addressing
- Windows Firewall
- Advanced Networking

Chapter 5: SERVER STORAGE

- Traditional Storage
- VHD Storage
- Storage Pools
- iSCSI Storage
- Data Deduplication

Chapter 6: HYPER-V

- Virtualization Deployment
- Virtual Machines
- Virtual Machine Storage
- Virtual Networks
- Virtual Network Optimization
- Virtual Machine Movement

Chapter 7: ACTIVE DIRECTORY

- Active Directory
- Domain Controllers
- Sites
- Organizational Units
- Users Accounts
- Bulk User Operations
- Computer Accounts
- Groups
- Rights Delegation
- Azure AD

Chapter 8: GROUP POLICY

- Group Policy Foundation
- Group Policy Management
- Password Policies
- Audit Policies
- User Rights Assignment
- Security Options
- Restricted Groups
- Application Restriction Policies
- Group Policy Preferences

Chapter 9: DNS

- DNS Overview
- Name Resolution
- Zone Management
- DNS Records
- DNS Troubleshooting

Chapter 10: FILE AND SHARE ACCESS

- File Access
- Access-based Enumeration (ABE) and Volume Shadow Copy (VSS)

- SMB Shares
- NFS Shares
- NTFS Permission Troubleshooting

Chapter 11: PRINT AND DOCUMENT SERVICES

- Print Servers
- Print Management

Chapter 12: SERVER MANAGEMENT

- Windows Software Update Services (WSUS)
- Malware Protection
- Windows Server Backup
- Windows Server Restore
- Performance Monitoring

Chapter 13: DHCP

- DHCP Basics
- DHCP Exclusions and Reservations
- DHCP Centralization
- DHCP Troubleshooting

Chapter 14: CONTAINERS

- Container Overview
- Container Host Installation
- Container Deployment
- Container Management

Chapter 15: HIGH AVAILABILITY

- Network Load Balancing
- Network Load Balancing Management
- Failover Clustering
- Failover Cluster Management
- Failover Cluster Role Management
- Hyper-V Replication and Migration
- Hyper-V High Availability
- Storage Replica
- Highly Available Storage Spaces

Lab Content

Chapter 1: INTRODUCTION

- Explore the Windows Server 2012 User Interface

Windows Server 2016 Interface Overview

- Explore the Windows Server 2016 User Interface

Chapter 2: SERVER INSTALLATION

Server 2012 Installation

- Installing Windows Server 2012

Server 2016 Installation

- Installing Windows Server 2016

Chapter 3: SERVER CONFIGURATION AND MANAGEMENT

PowerShell

- PowerShell Desired State Configuration (DSC)

Server Roles

- Install and Configure the File Server Role

Server Core Deployment

- Installing a Server Core 2012 Deployment
- Installing a Server Core 2016 Deployment
- Configuring a Server Core Installation
- Managing a Server Core Installation with PowerShell

Remote Server Management

- Remote Role Deployment
- Deploying Roles on Remote Servers

Chapter 4: NETWORKING

IPv4 Addressing

- Configure IP Settings

IPv6 Addressing

- Configure IPv6

Advanced Networking

- Configure NIC Teaming

Chapter 5: SERVER STORAGE

Traditional Storage

- Configure Volumes
- Configure Fault Tolerant Volumes
- Create a Mount Point

Virtual Hard Disk (VHD) Storage

- Create and Mount a VHD

Storage Pools

- Create a Storage Pool

Internet Small Computer Systems Interface (iSCSI) Storage

- Configure an iSCSI Target
- Configure the iSCSI Initiator

Chapter 6: HYPER-V

Virtual Machines

- Create Virtual Machines

Virtual Machine Storage

- Create Virtual Hard Disks
- Create a Parent Virtual Machine
- Create Child Virtual Machines

Virtual Networks

- Create Virtual Switches
- Prepare a Production Virtual Machine

Chapter 7: ACTIVE DIRECTORY

Sites

- Configure Sites

Organizational Units

- Create Organizational Units
- Delete Organizational Units

Users Accounts

- Create User Accounts
- Manage User Accounts

Computer Accounts

- Create Computer Accounts

Groups

- Create Global Groups
- Create a Distribution Group
- Change the Group Scope
- Implement a Group Strategy

Rights Delegation

- Delegate Administrative Control

Chapter 8: GROUP POLICY(GPO)

Group Policy Foundation

- Create and Link a GPO
- Create a Starter GPO

Password Policies

- Configure Account Password Policies

Audit Policies

- Configure Audit Policies

User Rights Assignment

- Configure User Rights

Security Options

- Configure Security Options
- Enforce User Account Control

Restricted Groups

- Configure Restricted Groups

Application Restriction Policies

- Configure AppLocker

Chapter 9: DNS

DNS Overview

- Configure Search Suffixes

Name Resolution

- Configure Forwarders
- Create a Root Zone

Zone Management

- Create an Active Directory-integrated Zone
- Convert a Zone to Active Directory-integrated

DNS Records

- Create a Zone and Add Records
- Create CNAME Records

Chapter 10: FILE AND SHARE ACCESS

File Access

- Configure New Technology File System (NTFS) Permissions
- Remove Inherited Permissions
- Enable Quota Restrictions
- Create a Quota Entry
- Modify Quota Limits

Access-based Enumeration (ABE) and Volume Shadow Copy (VSS)

- Enable Shadow Copies
- Restore Previous Version 1
- Restore Previous Version 2

SMB Shares

- Share a Folder with a Second Name
- Remove a Shared Folder
- Enable Share Caching
- Disable Share Caching
- Configure Share Permissions

NTFS Permission Troubleshooting

- Configure NTFS and Share Permissions 1
- Configure NTFS and Share Permissions 2

Chapter 11: PRINT AND DOCUMENT SERVICES

Print Servers

- Create and Share a Printer

Print Management

- Configure Printer Pooling
- Restrict Printer Access
- Deploy Printers with Group Policy

Chapter 12: SERVER MANAGEMENT

Windows Software Update Services (WSUS)

- Configure Computer Groups
- Configure Client-side Targeting

Windows Server Backup

- Back-Up a Server

Chapter 13: DHCP

Dynamic Host Configuration Protocol (DHCP) Basics

- Install and Configure a DHCP Server
- Configure DHCP Options

DHCP Exclusions and Reservations

- Create Exclusion Ranges
- Create Client Reservations

DHCP Centralization

- Configure a DHCP Relay Agent
- Create a Split DHCP Scope

DHCP Troubleshooting

- Configure Automatic and Alternate Addressing

Chapter 14: CONTAINERS

Container Host Installation

- Container Host Installation

Chapter 15: HIGH AVAILABILITY

Network Load Balancing (NLB) Management

- Configure an NLB Cluster 1
- Configure an NLB Cluster 2

Failover Clustering

- Create a Failover Cluster
- Configure Cluster Quorum Settings
- Add Storage to a Cluster

Failover Cluster Role Management

- Add a Failover Cluster Role
- Configure Failover and Preference Settings

Hyper-V Replication and Migration

- Migrate Virtual Machine Storage
- Migrate a Virtual Machine

Course Objectives

	Objectives
Objective 1	Install, upgrade, and migrate servers and workloads
Objective 2	Install and configure a Nano Server
Objective 3	Create, Manage, and maintain images for deployment
Objective 4	Configure disks and volumes
Objective 5	Implement Storage Server
Objective 6	Implement data deduplication
Objective 7	Install and configure Hyper-V
Objective 8	Configure virtual machine (VM) settings
Objective 9	Configure Hyper-V storage
Objective 10	Configure Hyper-V networking

Objective 11	Deploy Windows containers
Objective 12	Manage Windows containers
Objective 13	Implement high availability and disaster recovery options in Hyper-V
Objective 14	Implement failover clustering
Objective 15	Implement storage spaces direct
Objective 16	Manage failover clustering
Objective 17	Manage VM(Virtual Machine) movement in clustered nodes
Objective 18	Implement network load balancing (NLB)
Objective 19	Maintain Server installations
Objective 20	Monitor Server installations

Student Learning Outcomes

Upon satisfactory completion of this course, students will be able to:

Outcome 1	Install, configure, and manage server hardware and server operating systems.
Outcome 2	Demonstrate understanding of key disaster recovery, high-availability, and backup concepts and implement proper server hardening and security controls.
Outcome 3	Demonstrate the successful troubleshooting of common server problems.

Methods of Instruction

Method	Please provide a description or examples of how each instructional method will be used in this course.
Activity	Example: Using VirtualBox (or VMware Workstation) configure the virtual hardware and install Microsoft Windows Server 2019.
Laboratory	Examples: Continuing work throughout the course using hands-on (classroom) and virtual computing devices and software necessary to install, maintain, and troubleshoot Windows and Linux server operating systems.
Collaborative/Team	Examples: Collaborative / cooperative projects/cooperative learning tasks in small groups in order to encourage students to develop and apply collaboration skills.
Lecture	Examples: Lectures to introduce and clarify the various server roles such as directory services (Active Directory), DHCP & DNS services, web services, application services, etc.
Other (Specify)	Example: Individual projects to demonstrate the knowledge and skills necessary to hardening a server's hardware, operating system, and applications to prevent unauthorized intrusion or damage from internal or external malicious activity.
Activity	Example: Given a scenario, set correct NTFS File System Permissions and Shared Folder Permissions for a virtual Windows Server 2019 machine. Example: Use Red Hat Enterprise Linux iSCSI initiator to connect to an iSCSI target.

Methods of Evaluation

Method	Please provide a description or examples of how each evaluation method will be used in this course.	Type of Assignment
Written homework	Example: Given a scenario, calculate appropriate storage capacity and plan for future growth.	In and Out of Class
Mid-term and final evaluations	Final examination and skills evaluation of student's knowledge of all Domains and Objectives of the most current CompTIA Server+ Certification Exam.	In and Out of Class

Tests/Quizzes/Examinations	Examples: Weekly quizzes designed to assess students' mastery of the materials covered in previous week(s).	In and Out of Class
Computational/problem-solving evaluations	Example: Using Cisco Packet Tracer, plan server IP configuration settings for a proposed network including subnet(s), default gateway(s), VLANs, DNS and DHCP server settings.	In and Out of Class
Laboratory projects	Example: Various projects throughout the course using hands-on and online virtual servers, workstations and various networking devices and software.	In and Out of Class

Assignments

Other In-class Assignments

- Complete a flow chart indicating correct procedures for documenting a given server environment.
- Describe the proper configuration for a given server performance issue.
- Troubleshoot a Server that contains a given hardware or software problem in the server's set-up.

Other Out-of-class Assignments

Students will be given case-based assignments involving web research, technical manuals, and general textbook reading regarding the various topics covered in the course.

The following out-of-class assignments may also be used in the course:

- Projects (for example):
 - Given a scenario, install and configure a (virtual) Red Hat Enterprise Linux server
 - Given a scenario, develop an appropriate disaster recovery and business continuity plan for a certain business. Consider all possible failures, malicious activities or disaster scenarios which could disrupt all or most business operations for an extended period of time.
- Research projects (for example):
 - Research troubleshooting methods for given server hardware and/or software problems.
 - Research

Grade Methods

Letter Grade Only

Distance Education Checklist

Include the percentage of online and on-campus instruction you anticipate.

Lab Courses

How will the lab component of your course be differentiated from the lecture component of the course?

The lab component of this course is identical for both face-to-face and online students. The online labs provide students the opportunity to use real Cisco hardware and Windows and Linux operating systems in a virtualized environment which accurately simulates the hands-on use of such hardware and software.

The lecture portion of the course for online students will be delivered via annotated PowerPoint presentations, videos and written descriptions of the materials being covered each week throughout the semester.

From the COR list, what activities are specified as lab, and how will those be monitored by the instructor?

As described above, online, web-based resources integrated with TestOut include virtual computer labs that will allow students to practice, explore and try different solutions using real Cisco hardware and virtualized Windows and Linux operating systems. The integrated TestOut software provides the instructor with the ability to monitor when students have accessed the labs, the time(s) spent on them and their on-going progress, in addition to the final results of their work.

How will you assess the online delivery of lab activities?

The results of student work on the online labs are integrated into the LMS in real time. This means that as students complete the assigned labs, their score is ported to the gradebook in Canvas As stated above, the integrated e-materials provide the instructor with the ability to monitor, when students have accessed the labs, the time(s) spent on them and their on-going progress in addition to the final results of their work.

Instructional Materials and Resources

If you use any other technologies in addition to the college LMS, what other technologies will you use and how are you ensuring student data security?

The TestOut lab simulations of computer networks are accessible to students through Canvas from which they will connect to the TestOut exercises integrated with the e-Book materials. This is the same procedure which face-to-face students use to access these labs

If used, explain how specific materials and resources outside the LMS will be used to enhance student learning.

As described above, the TestOut virtualized hardware and software exercises provide a substitute for hands-on work with hardware when in working with servers and networking devices.

These simulations will give students the "hands on" experience they need to be successful in class, obtaining their CompTIA Network + Certification (if they so desire) and in finding or enhancing a career in the IT field.

Effective Student/Faculty Contact

Which of the following methods of regular, timely, and effective student/faculty contact will be used in this course?

Within Course Management System:

Chat room/instant messaging
Discussion forums with substantive instructor participation
Online quizzes and examinations
Private messages
Regular virtual office hours
Timely feedback and return of student work as specified in the syllabus
Weekly announcements

External to Course Management System:

Direct e-mail
Posted audio/video (including YouTube, 3cm mediasolutions, etc.)
Synchronous audio/video
Telephone contact/voicemail

Briefly discuss how the selected strategies above will be used to maintain Regular Effective Contact in the course.

Taken together, the strategies, used on a weekly or more frequent basis will ensure that there will be multiple ongoing contacts with students. Some examples:

* Announcements of upcoming topics, comments on (overall) class achievements, answers to general questions, etc., sent more frequently than weekly provide regular communication with the class.

* Occasional or weekly discussions, with substantial instructor feedback, will provide an opportunity for individualized assessment of students' understanding.

* Regular weekly quizzes and occasional homework assignments provide another regular opportunity to gauge individual student understanding and progress and to provide video, audio or email feedback to the students.

* Labs are assigned weekly; many times multiple labs are required in each week. As described above, this work is easily monitored by the instructor and provides multiple opportunities to interact individually with the students throughout the semester

Other Information

MIS Course Data

CIP Code

11.0101 - Computer and Information Sciences, General.

TOP Code

070100 - Information Technology, General

SAM Code

C - Clearly Occupational

Basic Skills Status

Not Basic Skills

Prior College Level

Not applicable

Cooperative Work Experience

Not a Coop Course

Course Classification Status

Credit Course

Approved Special Class

Not special class

Noncredit Category

Not Applicable, Credit Course

Funding Agency Category

Not Applicable

Program Status

Program Applicable

Transfer Status

Transferable to CSU only

General Education Status

Y = Not applicable

Support Course Status

N = Course is not a support course

C-ID

ITIS 155

Allow Audit

Yes

Repeatability

No

Materials Fee

No

Additional Fees?

No

Approvals**Curriculum Committee Approval Date**

9/15/2022

Academic Senate Approval Date

10/04/2022

Board of Trustees Approval Date

11/10/2022

Chancellor's Office Approval Date

03/24/2023

Course Control Number

CCC000579570

Programs referencing this courseLiberal Arts: Business and Technology AA Degree (<http://catalog.collegeofthedesert.eduundefined/?key=27>)Cyber Security Specialist (<http://catalog.collegeofthedesert.eduundefined/?key=316>)Computer Information Systems Associate of Science (<http://catalog.collegeofthedesert.eduundefined/?key=323>)Computer Information Systems AS Degree for Employment Preparation (<http://catalog.collegeofthedesert.eduundefined/?key=61>)