Montgomery County Community College
CIS 168
Data Centers and Cloud Storage
3-2-2

COURSE DESCRIPTION:
This course will teach a student about the components and functioning of a data center and the components of modern information storage infrastructure, including virtual data storage environments. The course will provide comprehensive learning of storage technology and prepares a student to learn advanced concepts, technologies, and products. A student will learn about the architectures, features, and benefits of Intelligent Storage Systems; storage networking technologies and the increasingly critical area of information security in the emerging field of cloud computing.

REQUISITES:
Previous Course Requirements
 − CIS 166 Introduction to Cloud Computing.

Concurrent Course Requirements
None

LEARNING OUTCOMES Upon successful completion of this course, the student will be able to:	LEARNING ACTIVITIES	EVALUATION METHODS
1. Design and configure a Data Center.	Lecture/Discussion Hands on Labs Homework Assignments Research	Discussion/Questions Research Presentations Skills based assessment
2. Configure and utilize storage networking technologies.	Lecture/Discussion Hands on Labs Homework Assignments Assigned readings Research	Discussion/Questions Research Presentations Skills based assessment
3. Design and configure a Virtualized Data Center.	Lecture/Discussion Hands on Labs Homework Assignments Assigned readings Research	Discussion/Questions Research Presentations Skills based assessment
4. Evaluate virtualized storage options.	Lecture/Discussion Hands on Labs Homework Assignments Assigned readings Research	Discussion/Questions Research Presentations Chapter Quiz

LEARNING OUTCOMES	LEARNING ACTIVITIES	EVALUATION METHODS
5. Explain the securing and management of storage infrastructure.	Lecture/Discussion Hands on Labs Homework Assignments Assigned readings Research	Discussion/Questions Research Presentations Chapter Quiz Final Skills based assessment and written final exam.

At the conclusion of each semester/session, assessment of the learning outcomes will be completed by course faculty using the listed evaluation method(s). Aggregated results will be submitted to the Associate Vice President of Academic Affairs. The benchmark for each learning outcome is that *70% of students will meet or exceed outcome criteria.*

SEQUENCE OF TOPICS:

Data Centers

Chapter 1: Introduction to Information Storage

Evolution of storage architecture, key data center elements, and design considerations. Components, addressing scheme, and performance of mechanical and solid-state drives. Host access to storage via direct attached and network-based options.

Chapter 2: Data center environment

Key data center elements: Host (or compute), connectivity, storage, and application in both classic and virtual environments.

Chapter 3: RAID

RAID implementations, techniques, and levels; impact of RAID on application performance.

Chapter 4: Intelligent Storage system

Components of intelligent storage systems, virtual storage provisioning and intelligent storage system implementation.

Storage Networking Technologies

Chapter 5: Fibre Channel Storage Area Network (FC SAN)

FC SAN components, connectivity options, and topologies including access protection mechanism 'zoning'. FC protocol stack, addressing, and other fabric services. SAN-based virtualization and VSAN technology.

Chapter 6: IP SAN and Fibre Channel over Ethernet (FCoE)

iSCSI and FCIP protocols for storage access over IP network, converged protocol FCoE and components.

Chapter 7: Network Attached Storage (NAS)

File sharing technology using NAS, benefits, components, and implementations; and file level storage virtualization.

Chapter 8: Object based and Unified Storage

Object-based and unified storage solutions, content addressed storage (CAS) as an implementation of object-based solution.

Virtualized Data Center (VDC)

Chapter 9: VDC Storage and Networking

Chapter 10: Designing the storage environment

Chapter 11: Infrastructure as a Service (IaaS)

Securing and Managing Data Centers

Chapter 12: Securing and managing the Information Infrastructure, framework and domains of storage security, security implementation at storage networking, security in virtualized and cloud environments.

LEARNING MATERIALS:
Information Storage and Management: EMC Education Services: Second Edition
    ISBN-10: 1118094832

Students will have free access to EMC data storage software in the lab.

COURSE APPROVAL:
Prepared by: Anil Datta   Date: 9/6/2013
VPAA/Provost Compliance Verification: Date: 1/2014

This course is consistent with Montgomery County Community College's mission. It was developed, approved and will be delivered in full compliance with the policies and procedures established by the College.