

# CLOUD COMPUTING (CCOM)

## **CCOM 1001 – Intro to Information Technolog 3 credit hours**

This course introduces students to the fundamentals of computer hardware and software, mobile devices, basic security and networking concepts. Various Computer Operating Systems will be introduced, such as Linux and Microsoft Desktop and Server Operating Systems. This will also include the concept of Virtual Machines. 3 credit hours

**Schedule type:** Independent Study, Web

## **CCOM 1002 – PC Hardware and Software Lab 3 credit hours**

AZWS 1002 is the lab portion of AZWS 1001. The focus of this course is to gain additional hands-on experience to the material that has been presented in AZWS 1001. That course introduced students to the fundamentals of computer hardware and software, mobile devices, basic security and networking concepts. AZWS 1001 covered various Computer Operating Systems, including Linux, as well as Microsoft Desktop and Server Operating Systems. This included the concepts of virtualization and Virtual Machines.

**Schedule type:** Independent Study, Laboratory, Web

## **CCOM 1004 – Intro to Programming&Scripting 3 credit hours**

This course introduces students to basic programming languages and their inherent logic structures (variable types, variable declaration and assignment, looping and branching structures). The students will develop an understanding for local and global variables and will select the correct looping and branching structures and apply them as needed. Programming languages such as Visual Basic and Python may be used for this purpose. This will allow for the introduction of Structured Programming with Pseudo Code as well as Object Driven Programming (On Click). The students will also learn how to automate repetitive tasks within Computer Operating Systems through the use of Shell Scripts in Linux and the Power Shell in Microsoft Windows Operating Systems

**Schedule type:** Independent Study, Web

## **CCOM 1021 – Fund of of AWS Cloud Services 3 credit hours**

This course will introduce the students to the resources and services that constitute the AWS Cloud. Beginning with the building block of Elastic Cloud Compute (EC2) which is the configuration and provisioning of virtual servers in the Amazon Cloud. Next the concept of Elastic Block Storage (EBS) volumes will be shown to the students. The students will then be introduced to the Simple Storage Service (S3) and the Amazon Global Infrastructure, consisting of AWS Regions, AWS Availability Zones, and AWS Edge Locations and their functions. The students will be shown the configuration of the Amazon Virtual Private Cloud (VPS) which allows for total customization of the network configuration within the AWS Cloud. This will be followed by AWS Security Groups, which are essentially firewalls within the AWS Cloud. Other concepts that will be introduced to the students are AWS Application Load Balancer, which creates advanced routing rules to EC2 services. The course will continue with an introduction to AWS Route 53, an advanced DNS service for applications within the AWS Cloud, AWS Lambda, which allows the execution of code in a serverless environment, Amazon Relational Database Service (RDS), which greatly simplifies the administration of Relational Database Management Systems. Other topics that will be part of this course are AWS Auto Scaling, AWS Elastic Beanstalk, Amazon Simple Notification Service (SNS), Amazon Cloud Watch, an advanced monitoring service for resource usage, Amazon Cloud Front, which is used at Amazon Edge Locations, and AWS Cloud Formation which automates Resource Provisioning. Students will be introduced to the three ways to access AWS services (AWS Console, CLI, and APIs). Pre-Requisites AZWS 1001 Introduction to Information Technology, 3 credit hours

**Pre-requisite(s):** CCOM 1001

**Schedule type:** Independent Study, Web

## **CCOM 1023 – Intro to Networking 3 credit hours**

The course will introduce the students to LAN and WAN networking concepts for a small to medium sized network. The course will cover the OSI Layer model in great detail and describe the function of each layer. It will also introduce the concepts of Encapsulation (when sending data) and De-Encapsulation (when receiving data). The course will cover the networking processes on OSI Layers 2, 3, and 4. The functions of MAC addresses on Layer 2, and IPv4, IPv6, ARP, RARP, and NDP on Layer 3 will be discussed to a great depth. The Layer 4 protocols of TCP and UDP will be introduced. The students will be introduced to Wired Network Topologies (Bus, ring, Star, Mesh). The function and basic configuration of Layer 2 Switches and Routers will be covered, to include VLANs, Port Security, Static Routing and Dynamic Routing with RIP version 2 and RIP NG. The course will also introduce cabling media with a focus on UTP Straight Through and UTP Crossover cables. Students should have completed AZWS 1001 and AZWS 1002 successfully. The students will also be introduced to Wireless Network Topologies. Basic network security will also be included in this course.

**Pre-requisite(s):** CCOM 1001, CCOM 1002

**Schedule type:** Independent Study, Web

**CCOM 1027 – Windows Client Server 1****3 credit hours**

This course will introduce the student to the installation and configuration of Windows 10 Operating System (the client) and Windows Server 2016 R2 Operating System (the server). The students will be introduced to the different editions of Windows 10 and Windows Server 2016 R2 and the hardware required to complete a successful installation of the different editions. Network Configuration of Windows 10 to a Workgroup Network and a Domain Network will be covered, including the configuration of the IPv4 address, IPv4 Subnet Mask, IPv4 Gateway and IPv4 DNS Server. Students will be introduced to Built-In User Accounts and Groups, Local User Accounts and Groups, and Domain User Account, Domain Local Groups, Domain Global Groups and how to administer their Access Privileges, Passwords, and Security. Windows File Systems (FAT32 and NTFS) will be introduced and the advantages and disadvantages of Basic Disks and Dynamic Disks will be shown. The students will configure Partitions for Basic Disks and Volumes for Dynamic Disks. The students will be introduced to Fault Tolerance configuration with RAID 0, RAID 1, and RAID 5 on Dynamic Disks. The students will be introduced to Remote Access to Windows 10 and Windows Server 2016 R2 with Remote Desktop. Backup and Restore Functions will be demonstrated as well as the configuration of Restore Points in Windows 10. The administration of Windows 10 and Windows Server 2016 R2 with MMC Snap-Ins will be demonstrated. The students will be introduced to the configuration of Windows Server 2016 R2 Infrastructure Server roles (File and Print Sharing, DHCP Server, DNS Server). Security and Firewall configuration for Windows 10 and Windows Server 2016 R2 will be demonstrated. The students will then be introduced to the concept of Active Directory and the Domain Controller Server role.

**Pre-requisite(s):** CCOM 1001, CCOM 1002, CCOM 1004**Schedule type:** Independent Study, Web**CCOM 1030 – Linux Desktop & Server OS****3 credit hours**

The course will introduce the Linux Operating System as a Client Operating System with GUI as well as a Server Operating System with or without GUI. The students will be introduced to the CentOS Linux flavor, as it closely resembles the Red Hat Linux distribution, which is the most popular Linux distribution in North American production environments. Alternatively, the instructor may elect to use Novell's SUSE Linux distribution which is also popular in North America. The students will be introduced to the installation of Linux as a Client Operating System and the installation of Linux as a Server Operating System. Both installation options will have a greatly different selection of Operating System elements - i.e. Packages to be installed. The students will then be introduced to the Linux Boot Process and the function of the Bootloader (GRUB). The different Linux Run levels will be discussed and how to configure or change the Default Run level in the /etc/inittab file. The function of the K and S pointers for the start or non-start of different background services will be discussed. The students will then be shown how to manipulate the /etc/fstab file to account for the mounting of different file system. The students will be shown that Linux Operating Systems have a separate partition for Virtual Memory. The students will then be introduced to the Command Line Interface and the most common Linux commands. The vi text editor will be covered in great detail, as it is included on all distributions of Linux and it will be used throughout the course to edit Linux Configuration files. The students will be shown how to set file and folder permissions with the chmod command using Absolute (Numbers) and Symbolic Notations (RWX). The students will configure the Linux Server to share folders via NFS and to create a centralized user and group database with NIS. The Linux Client will mount the shared home directories of the Linux Server via NFS. The Linux Server machine will be configured to host DNS (named) and E-mail (sendmail) services. The students will be shown the sharing of folders and printers of the Linux Server with Microsoft Windows machines through the SAMBA service. Remote Access to the Linux Server and the Linux Client via SSH will be demonstrated. The students will be shown how to host multiple web sites on the Linux Server through the Apache Web Server. 3 Credit Hours

**Pre-requisite(s):** CCOM 1023, CCOM 1027**Co-requisite(s):** CCOM 1033**Schedule type:** Independent Study, Web**CCOM 1033 – Intermediate Networking****3 credit hours**

Whereas AZWS 1023 Introduction to Networking placed its focus on Local Area Networks, this course, AZWS 1033 will predominantly address Wide Area Network concepts. The students will perform IPv4 CIDR subnetting tasks, implement them on Cisco routers and switches, and test their connectivity. The students will do the same for IPv6 design objectives. The students will be introduced to Remote Access to Cisco routers and switches via SSH/Telnet. The students will be shown how to configure Static Routes for IPv4 and IPv6 on Cisco routers. They will learn how to configure RIP version 2, OSPF, and EIGRP routing for IPv4 on Cisco routers. The students will then learn how to configure RIP NG and OSPF v.3 routing for IPv6. The students will be introduced to Standard, Extended, and Named IPv4 Access Control Lists. They will also be shown how to implement Access Control Lists for IPv6 on Cisco routers. The students will be shown how to create IPv4 tunnels for IPv6 and IPv6 tunnels for IPv4 on Cisco routers. The students will be introduced to the configuration of different WAN protocols on Cisco routers. The configuration of Port Security, VLAN's, and Ether Channel on Cisco switches will be demonstrated. 3 Credit Hours

**Schedule type:** Independent Study, Web

**CCOM 1037 – Windows Client Server 2 3 credit hours**

This course will use the foundation of AZWS 1027 and focus exclusively on the Windows Server 2016 R2 Domain Controller server role. The course will deepen the students' understanding of classful and classless IPv4 configuration as well as IPv6, and how to apply this to a Windows Server 2016 R2 domain. The function of DNS will be discussed as a pre-requisite for the Domain Controller server role and the importance of a correct DNS Naming Convention for User Principal Names and other objects in a Windows Server 2016 R2 domain. The importance of correct DNS Forward and Reverse Lookup Zones will be covered. The students will then be shown how to implement the DNS role on a Windows Server 2016 R2 Operating System. Next the students will be introduced to the process of implementing the Domain Controller server role and how to integrate a second Windows Server 2016 R2 domain controller into an existing Windows domain. The students will configure the DHCP server role and authorize it in Active Directory. The students will be introduced to the structure of Active Directory consisting of Container and Leaf objects, and their properties as defined by the Active Directory Schema. The function of Domain Container Objects and Organizational Unit Container Objects in building a logical structure in which the Active Directory database should be organized. The students will be shown how this structure is used for the configuration of User Rights and Access Privileges to Domain resources. The students will be shown how Domain Controllers share the Active Directory database and replicate any changes among them. The students will be introduced how the Active Directory database is replicated between Active Directory Sites. The students will be shown the function of the Global Catalogue and the Flexible Single Master Operation Roles within Active Directory. The students will be introduced to the concept of delegation of Administrative Privileges for specific Organizational Unit Container objects. The students will then learn how to use Group Policies for the administration of User and Group Rights and Access to Domain resources. Finally the students will be introduced to Active Directory Maintenance tasks, how to Troubleshoot errors and how to perform Disaster Recovery in case of failure. 3 credit hours

**Schedule type:** Independent Study, Web

**CCOM 1045 – Introduction to Security 3 credit hours**

This course will introduce the students with the concepts of IT Security. As such it will survey the most common security practices with regard to Linux and Windows Operating System security. The students will be shown how to perform Vulnerability Scans of both Operating System platforms and the generally accepted configuration options to harden these Operating System. The security configuration of Database servers and Web Servers will be part of this introduction. The students will be introduced to LAN and WAN security including the configuration of Firewall Appliances, Intrusion Detection System, Intrusion Prevention Systems, and Router Security. The course will also introduce some common Hacking Techniques to familiarize the students with the tools of the trade. The students will be introduced to Forensic Analysis and what to do and what not to do in case a system or network has been penetrated so as not to contaminate any evidence. The students will also be made to understand that IT Security is a process that demands constant attention. The students will also learn that proper documentation of all Security Techniques applied is of utmost importance. 3 credit hours

**Pre-requisite(s):** CCOM 1030, CCOM 1033, CCOM 1037

**Schedule type:** Independent Study, Web