DATE OF LAST REVIEW: 02/2013

CIP CODE: 11.0901

SEMESTER: Departmental Syllabus

COURSE TITLE: Designing and Supporting Computer Networks

COURSE NUMBER: NETW 0148

CREDIT HOURS: 8

INSTRUCTOR: Departmental Syllabus

OFFICE LOCATION: Departmental Syllabus

OFFICE HOURS: Departmental Syllabus

TELEPHONE: Departmental Syllabus

EMAIL: KCKCC issued email accounts are the official means for electronically communicating with our students.

PREREQUISITE(S): NETW 0146 Routing and Switching in the Enterprise

REQUIRED TEXT AND MATERIALS: Please check with the KCKCC bookstore, http://www.kckccbookstore.com/, for the required texts for your particular class.

COURSE DESCRIPTION:
Designing and Supporting Computer Networks is a course designed to introduce students to concepts many technicians are required to perform. Students will learn to gather customer requirements and design a simple Internetwork using Cisco technology. Students will be required to design an IP addressing scheme to meet LAN requirements and create an equipment list to meet LAN design requirements. Students will learn how to create and present a proposal to a customer and install and configure a prototype Internetwork. Students will be taught how to obtain and upgrade Cisco IOS Software in Cisco devices and perform password recovery on Cisco devices.
METHOD OF INSTRUCTION: A variety of instructional methods may be used depending on content area. These include but are not limited to: lecture, multimedia, cooperative/collaborative learning, labs and demonstrations, projects and presentations, speeches, debates, panels, conferencing, performances, and learning experiences outside the classroom. Methodology will be selected to best meet student needs.

COURSE OUTLINE:

I. Introducing Network Design Concepts
   A. Discovering Network Design Basics
   B. Network Design Overview
   C. The Benefits of a Hierarchical Network Design
   D. Network Design Methodologies
   E. Investigating Core Layer Design Considerations
   F. What Happens at the Core Layer?
   G. Network Traffic Prioritization
   H. Network Convergence
   I. Investigating Distribution Layer Design Considerations
   J. What Happens at the Distribution Layer?
   K. Limiting the Scope of Network Failure
   L. Building a Redundant Network
   M. Traffic Filtering at the Distribution Layer
   N. Routing Protocols at the Distribution Layer
   O. Investigating Access Layer Design Considerations
   P. What Happens at the Access Layer?
   Q. Network Topologies at the Access Layer
   R. How VLANs Segregate and Control Network Traffic
   S. Services at the Network Edge
   T. Security at the Network Edge
   U. Security Measures
   V. Investigating Server Farms and Security
   W. What is a Server Farm?
   X. Security, Firewalls, and DMZs
   Y. High Availability
   Z. Investigating Wireless Network Considerations
      AA. Considerations Unique to WLAN
      BB. Providing Different Levels of Wireless Access
      CC. Supporting WANs and Remote Workers
      DD. Design Considerations at the Enterprise Edge
      EE. Integrating Remote Sites Into the Network Design
      FF. Redundancy and Backup Links
II. Gathering Network Requirements
   A. Introduction to Lifecycle Services
   B. The Lifecycle of a Network
   C. The Network Lifecycle Prepare Phase
   D. The Network Lifecycle Plan Phase
   E. The Network Lifecycle Design Phase
   F. The Network Lifecycle Implement Phase
   G. The Network Lifecycle Operate Phase
   H. The Network Lifecycle Optimize Phase
   I. Explaining the Sales Process
   J. Respond to Customer Request for Proposal or Quote
   K. Attend a Pre-bid Meeting
   L. Explain the Request for Proposal (RFP)
   M. Explain the Request for Quote (RFQ)
   N. Explain the Role of the Account Manager
   O. Explain the Role of the Pre-Sale Systems Engineer
   P. Explain the Role of the Network Designer
   Q. Explain the Role of the Post-Sale Field Engineer
   R. Preparing for the Design Process
   S. Working with the Customer
   T. Defining the customer
   U. Identifying Business Goals and Priorities
   V. Identifying Technical Requirements and Constraints
   W. Defining Technical Requirements
   X. Identifying Constraints
   Y. Identifying Manageability Design Considerations
   Z. Using the Top Down Design Approach
   AA. Monitoring Network Operations
   BB. Tools for Network Monitoring

III. Characterizing the Existing Network
   A. Documenting the Existing Network
   B. Creating a Network Diagram
   C. Diagramming the Logical Architecture
   D. Developing a Modular Diagram
   E. Strengths and Weaknesses of the Existing Network
   F. Updating the Existing Cisco IOS
   G. Cisco CCO Features and Navigation New
   H. Investigating the Installed Cisco IOS Software
   I. Choosing an Appropriate Cisco IOS Image
   J. Download and Install Cisco IOS Software
   K. The Router Startup Process
   L. Upgrading Existing Hardware
   M. Investigating Installed Hardware Features
   N. Investigating Appropriate Hardware Options
   O. Installing a New Hardware Option
   P. Performing a Wireless Site Survey
Q. Visiting the Customer Site
R. Physical Network Considerations
S. Wireless Site Survey and Planning
T. Documenting Network Design Requirements
U. Creating a Network Design Requirements Document
V. Overall Project Goal
W. Project Scope
X. Business Goals and Technical Requirements
Y. Existing Network Characterization

IV. Identifying Application Impacts on Network Design
A. Characterizing Network Applications
B. The Importance of Application Performance
C. Characteristics of Different Application Categories
D. How Traffic Flow Affects Network Design
E. How Application Characteristics Affect Network Design
F. Explaining Common Network Applications
G. Transaction Processing
H. Real-Time Streaming and Voice
I. File Transfer and Email
J. HTTP and Web Traffic
K. Microsoft Domain Services
M. Introducing Quality of Service (QoS)
N. What Is Quality of Service and Why Is It Needed?
O. Traffic Queues
P. Priorities and Traffic Management
Q. Where Can QoS Be Implemented?
R. Examining Voice and Video Options
S. Converged Network Considerations
T. Requirements of an IP Telephony Solution
U. Video – Live and On-Demand
V. Supporting Remote Workers with Voice and Video
W. Documenting Applications and Traffic Flows
X. What Is a Traffic Flow?
Y. Diagramming Internal (Intranet) Traffic Flows
Z. Diagramming Traffic Flows To and From Remote Sites
AA. Diagramming Internet Traffic Flows
BB. Diagramming ExtraNet Traffic Flows

V. Creating the Network Design
A. Analyzing the Requirements
B. Analyzing Business Goals & Technical Requirements
C. Requirements for Scalability
D. Requirements for Availability
E. Requirements for Network Performance
F. Requirements for Security
G. Making Network Design Tradeoffs
H. Selecting the Appropriate LAN Topology
I. Designing an Access Layer Topology
J. Designing Distribution Layer Topology
K. Designing Core Layer Topology
L. Creating the Logical Network Design for the LAN
M. Designing the WAN and Remote Worker Support
N. Determining Connectivity for Remote Sites
O. Defining Traffic Patterns and Application Support
P. Designing VPN End-Point Connectivity Options
Q. Creating the Logical Network Design for the WAN
R. Designing Wireless Networks
S. Designing Coverage Options and Mobility
T. Locating Wireless Access Points
U. Redundancy and Resiliency in a Wireless Network
V. Creating the Logical Network Design for the WLAN
W. Incorporating Security
X. Placing Security Functions and Appliances
Y. Implementing Access Control Lists and Filtering
Z. Updating the Logical Network Design Documentation

VI. Using IP Addressing in the Network Design
A. Creating an Appropriate IP Addressing Design
B. Using Hierarchical Routing and Addressing Schemes
C. Classful Subnets and Summarization
D. Using VLSM When Designing IP Addressing
E. Using CIDR Routing and Summarization
F. Creating the IP Address and Naming Scheme
G. Designing the Logical LAN IP Address Scheme
H. Determining the Addressing Blocks
I. Designating the Routing Strategy
J. Plan for Summarization and Route Distribution
K. Designing the Addressing Scheme
L. Designing a Naming Scheme
M. Describing IPv4 and IPv6
N. Contrasting IPv4 and IPv6 Addressing
O. Migrating from IPv4 to IPv6
P. Implementing IPv6 on a Cisco Device

VII. Prototyping the Campus Network
A. Building a Prototype to Validate a Design
B. Purpose of a Prototype
C. Creating a Test Plan
D. Verifying the Design Meets Goals and Requirements
E. Validating LAN Technologies and Devices
F. Test the Redundancy and Resiliency of the Network
G. Identify Risks or Weaknesses in the Design
H. Prototyping the LAN
I. Identify Goals and Requirements Met by LAN Design
J. Creating the Test Plan
K. Validate Device and Topology Selection
L. Validate Routing Protocol Selection
M. Validating the IP Addressing Scheme
N. Identifying Risks or Weaknesses
O. Prototyping the Server Farm
P. Identifying Server Farm Goals and Requirements
Q. Creating the Test Plan
R. Validating Device and Topology Selection
S. Validating the Security Plan
T. Verify Design Meets Business Goals
U. Identify Risks or Weaknesses

VIII. Prototyping the WAN
A. Prototyping Remote Connectivity
B. Describe Remote Connectivity Testing Methods
C. Testing WAN Connectivity with Simulation Software
D. Simulating WAN Connectivity in a Lab Environment
E. Prototyping WAN Connectivity
F. Identify WAN Goals and Requirements
G. Creating the Test Plan
H. Validate Device and Topology Selection
I. Prototype the WAN
J. Troubleshooting Frame Relay Operation
K. Identify Risks and Weaknesses
L. Prototyping Remote Worker Support
M. Identifying VPN Goals and Requirements
N. Creating the Test Plan
O. Validate Choice of VPN Technology, Devices and Topologies
P. Prototype VPN Connectivity for Remote Workers
Q. Validate Placement of VPN Server
R. Identify Risks or Weaknesses

IX. Preparing the Proposal
A. Assembling the Existing Proposal Information
B. Organizing the Existing Information
C. Integrating the Existing Information
D. Developing the Implementation Plan
E. The Implementation Plan
F. Determining the Best Installation Method
G. Estimating Timelines and Resources
H. Maintenance Windows and Downtime Planning
I. Planning for the Installation
J. Creating the Bill of Material
K. Recommending SMARTnet Services
L. Cisco Technical Services and Support
M. Software IOS Services and Support
N. Creating and Presenting the Proposal
O. Finalizing the Proposal
EXPECTED LEARNER OUTCOMES:
A. The student will be able to describe Introducing Network Design Concepts
B. The student will be able to describe Gathering Network Requirements
C. The student will be able to describe Characterizing the Existing Network
D. The student will be able to describe Identifying Application Impacts on Network Design
E. The student will be able to describe Creating the Network Design
F. The student will be able to describe Using IP Addressing in the Network Design
G. The student will be able to describe Prototyping the Campus Network
H. The student will be able to describe Prototyping the WAN
I. The student will be able to describe Preparing the Proposal

COURSE COMPETENCIES:

The student will be able to describe Introducing Network Design Concepts

1. The student will be able to describe Discovering Network Design Basics
2. The student will be able to describe Network Design Overview
3. The student will be able to describe The Benefits of a Hierarchical Network Design
4. The student will be able to describe Network Design Methodologies
5. The student will be able to describe Investigating Core Layer Design Considerations
6. The student will be able to describe What Happens at the Core Layer?
7. The student will be able to describe Network Traffic Prioritization
8. The student will be able to describe Network Convergence
9. The student will be able to describe Investigating Distribution Layer Design Considerations
10. The student will be able to describe What Happens at the Distribution Layer
11. The student will be able to describe Limiting the Scope of Network Failure
12. The student will be able to describe Building a Redundant Network
13. The student will be able to describe Traffic Filtering at the Distribution Layer
14. The student will be able to describe Routing Protocols at the Distribution Layer
15. The student will be able to describe Investigating Access Layer Design Considerations
16. The student will be able to describe What Happens at the Access Layer?
17. The student will be able to describe Network Topologies at the Access Layer
18. The student will be able to describe How VLANs Segregate and Control Network Traffic
19. The student will be able to describe Services at the Network Edge
20. The student will be able to describe Security at the Network Edge
21. The student will be able to describe Security Measures
22. The student will be able to describe Investigating Server Farms and Security
23. The student will be able to describe What is a Server Farm?
24. The student will be able to describe Security, Firewalls, and DMZs
25. The student will be able to describe High Availability
26. The student will be able to describe Investigating Wireless Network Considerations
27. The student will be able to describe Considerations Unique to WLAN Access
28. The student will be able to describe Providing Different Levels of Wireless Access
29. The student will be able to describe Supporting WANs and Remote Workers
30. The student will be able to describe Design Considerations at the Enterprise Edge
31. The student will be able to describe Integrating Remote Sites Into the Network Design
32. The student will be able to describe Redundancy and Backup Links

The student will be able to describe Gathering Network Requirements

33. The student will be able to describe Introduction to Lifecycle Services
34. The student will be able to describe The Lifecycle of a Network
35. The student will be able to describe The Network Lifecycle Prepare Phase
36. The student will be able to describe The Network Lifecycle Plan Phase
37. The student will be able to describe The Network Lifecycle Design Phase
38. The student will be able to describe The Network Lifecycle Implement Phase
39. The student will be able to describe The Network Lifecycle Operate Phase
40. The student will be able to describe The Network Lifecycle Optimize Phase
41. The student will be able to describe Explaining the Sales Process
42. The student will be able to describe Respond to Customer Request for Proposal or Quote
43. The student will be able to describe Attend a Pre-bid Meeting
44. The student will be able to describe Explain the Request for Proposal (RFP)
45. The student will be able to describe Explain the Request for Quote (RFQ)
46. The student will be able to describe Explain the Role of the Account Manager
47. The student will be able to describe Explain the Role of the Pre-Sale Systems Engineer
48. The student will be able to describe Explain the Role of the Network Designer
49. The student will be able to describe Explain the Role of the Post-Sale Field Engineer
50. The student will be able to describe Preparing for the Design Process
51. The student will be able to describe Working with the Customer
52. The student will be able to describe Defining the customer
53. The student will be able to describe Identifying Business Goals and Priorities
54. The student will be able to describe Identifying Technical Requirements and Constraints
55. The student will be able to describe Defining Technical Requirements
56. The student will be able to describe Identifying Constraints
57. The student will be able to describe Identifying Manageability Design Considerations
58. The student will be able to describe Using the Top Down Design Approach
The student will be able to describe Monitoring Network Operations

The student will be able to describe Tools for Network Monitoring

The student will be able to describe Characterizing the Existing Network

The student will be able to demonstrate Documenting the Existing Network

The student will be able to demonstrate Creating a Network Diagram

The student will be able to demonstrate Diagramming the Logical Architecture

The student will be able to demonstrate Developing a Modular Diagram

The student will be able to describe Strengths and Weaknesses of the Existing Network

The student will be able to describe Updating the Existing Cisco IOS

The student will be able to describe Cisco CCO Features and Navigation

The student will be able to describe Investigating the Installed Cisco IOS Software

The student will be able to demonstrate Choosing an Appropriate Cisco IOS Image

The student will be able to demonstrate Download and Install Cisco IOS Software

The student will be able to describe The Router Startup Process

The student will be able to describe Upgrading Existing Hardware

The student will be able to describe Investigating Installed Hardware Features

The student will be able to describe Investigating Appropriate Hardware Options

The student will be able to describe Installing a New Hardware Option

The student will be able to demonstrate Performing a Wireless Site Survey

The student will be able to describe Visiting the Customer Site

The student will be able to describe Physical Network Considerations

The student will be able to describe Wireless Site Survey and Planning

The student will be able to demonstrate Documenting Network Design Requirements

The student will be able to describe Creating a Network Design Requirements Document

The student will be able to describe Overall Project Goal

The student will be able to describe Project Scope

The student will be able to describe Business Goals and Technical Requirements

The student will be able to describe Existing Network Characterization

The student will be able to describe Identifying Application Impacts on Network Design

The student will be able to describe Characterizing Network Applications

The student will be able to describe The Importance of Application Performance

The student will be able to describe Characteristics of Different Application Categories

The student will be able to describe How Traffic Flow Affects Network Design

The student will be able to describe How Application Characteristics Affect Network Design

The student will be able to describe Explaining Common Network Applications
The student will be able to describe Transaction Processing
The student will be able to describe Real-Time Streaming and Voice
The student will be able to describe File Transfer and Email
The student will be able to describe HTTP and Web Traffic
The student will be able to describe Microsoft Domain Services
The student will be able to describe Introducing Quality of Service (QoS)
The student will be able to describe What Is Quality of Service and Why Is It Needed?
The student will be able to describe Traffic Queues
The student will be able to describe Priorities and Traffic Management
The student will be able to describe Where Can QoS Be Implemented?
The student will be able to describe Examining Voice and Video Options
The student will be able to describe Converged Network Considerations
The student will be able to describe Requirements of an IP Telephony Solution
The student will be able to describe Video – Live and On-Demand
The student will be able to demonstrate Supporting Remote Workers with Voice and Video
The student will be able to describe Documenting Applications and Traffic Flows
The student will be able to describe What Is a Traffic Flow?
The student will be able to demonstrate Diagramming Internal (Intranet) Traffic Flows
The student will be able to demonstrate Diagramming Traffic Flows To and From Remote Sites
The student will be able to describe Diagramming Internet Traffic Flows
The student will be able to describe Diagramming ExtraNet Traffic Flows

The student will be able to describe Creating the Network Design

The student will be able to describe Analyzing the Requirements
The student will be able to describe Analyzing Business Goals & Technical Requirements
The student will be able to describe Requirements for Scalability
The student will be able to describe Requirements for Availability
The student will be able to describe Requirements for Network Performance
The student will be able to describe Requirements for Security
The student will be able to describe Making Network Design Tradeoffs
The student will be able to describe Selecting the Appropriate LAN Topology
The student will be able to describe Designing an Access Layer Topology
The student will be able to describe Designing Distribution Layer Topology
The student will be able to describe Designing Core Layer Topology
The student will be able to describe Creating the Logical Network Design for the LAN
The student will be able to describe Designing the WAN and Remote Worker Support
The student will be able to describe Determining Connectivity for Remote Sites
127. The student will be able to describe Defining Traffic Patterns and Application Support
128. The student will be able to describe Designing VPN End-Point Connectivity Options
129. The student will be able to describe Creating the Logical Network Design for the WAN
130. The student will be able to describe Designing Wireless Networks
131. The student will be able to describe Designing Coverage Options and Mobility
132. The student will be able to describe Locating Wireless Access Points
133. The student will be able to describe Redundancy and Resiliency in a Wireless Network
134. The student will be able to describe Creating the Logical Network Design for the WLAN
135. The student will be able to describe Incorporating Security
136. The student will be able to describe Placing Security Functions and Appliances
137. The student will be able to describe Implementing Access Control Lists and Filtering
138. The student will be able to describe Updating the Logical Network Design Documentation

The student will be able to describe Using IP Addressing in the Network Design

139. The student will be able to demonstrate Creating an Appropriate IP Addressing Design
140. The student will be able to describe Using Hierarchical Routing and Addressing Schemes
141. The student will be able to demonstrate Classful Subnets and Summarization
142. The student will be able to describe Using VLSM When Designing IP Addressing
143. The student will be able to describe Using CIDR Routing and Summarization
144. The student will be able to demonstrate Creating the IP Address and Naming Scheme
145. The student will be able to describe Designing the Logical LAN IP Address Scheme
146. The student will be able to describe Determining the Addressing Blocks
147. The student will be able to describe Designating the Routing Strategy
148. The student will be able to describe Plan for Summarization and Route Distribution
149. The student will be able to describe Designing the Addressing Scheme
150. The student will be able to describe Designing a Naming Scheme
151. The student will be able to describe Describing IPv4 and IPv6
152. The student will be able to describe Contrasting IPv4 and IPv6 Addressing
153. The student will be able to describe Migrating from IPv4 to IPv6
154. The student will be able to describe Implementing IPv6 on a Cisco Device

The student will be able to describe Prototyping the Campus Network
The student will be able to describe Building a Prototype to Validate a Design

The student will be able to describe Purpose of a Prototype

The student will be able to describe Creating a Test Plan

The student will be able to describe Verifying the Design Meets Goals and Requirements

The student will be able to describe Validating LAN Technologies and Devices

The student will be able to describe Test the Redundancy and Resiliency of the Network

The student will be able to describe Identify Risks or Weaknesses in the Design

The student will be able to describe Prototyping the LAN

The student will be able to describe Identify Goals and Requirements Met by LAN Design

The student will be able to describe Creating the Test Plan

The student will be able to describe Validate Device and Topology Selection

The student will be able to describe Validate Routing Protocol Selection

The student will be able to describe Validating the IP Addressing Scheme

The student will be able to describe Identifying Risks or Weaknesses

The student will be able to describe Prototyping the Server Farm

The student will be able to describe Identifying Server Farm Goals and Requirements

The student will be able to describe Creating the Test Plan

The student will be able to describe Validate Device and Topology Selection

The student will be able to describe Validate the Security Plan

The student will be able to describe Verify Design Meets Business Goals

The student will be able to describe Identify Risks or Weaknesses

The student will be able to describe Prototyping the WAN

The student will be able to describe Prototyping Remote Connectivity

The student will be able to describe Describe Remote Connectivity Testing Methods

The student will be able to demonstrate Testing WAN Connectivity with Simulation Software

The student will be able to demonstrate Simulating WAN Connectivity in a Lab Environment

The student will be able to describe Prototyping WAN Connectivity

The student will be able to describe Identify WAN Goals and Requirements

The student will be able to describe Creating the Test Plan

The student will be able to describe Validate Device and Topology Selection

The student will be able to describe Prototype the WAN

The student will be able to describe Troubleshooting Frame Relay Operation

The student will be able to describe Identify Risks and Weaknesses

The student will be able to describe Prototyping Remote Worker Support

The student will be able to describe Identifying VPN Goals and Requirements

The student will be able to describe Creating the Test Plan
The student will be able to describe Validate Choice of VPN Technology, Devices and Topologies

The student will be able to describe Prototype VPN Connectivity for Remote Workers

The student will be able to describe Validate Placement of VPN Server

The student will be able to describe Identify Risks or Weaknesses

The student will be able to describe Preparing the Proposal

The student will be able to describe Assembling the Existing Proposal Information

The student will be able to describe Organizing the Existing Information

The student will be able to describe Integrating the Existing Information

The student will be able to describe Developing the Implementation Plan

The student will be able to describe The Implementation Plan

The student will be able to describe Determining the Best Installation Method

The student will be able to describe Estimating Timelines and Resources

The student will be able to describe Maintenance Windows and Downtime Planning

The student will be able to describe Planning for the Installation

The student will be able to describe Creating the Bill of Material

The student will be able to describe Recommending SMARTnet Services

The student will be able to describe Cisco Technical Services and Support

The student will be able to describe Software IOS Services and Support

The student will be able to describe Creating and Presenting the Proposal

The student will be able to describe Finalizing the Proposal

The student will be able to describe Presenting the Proposal

ASSESSMENT OF LEARNER OUTCOMES:
Student progress is evaluated by means that include, but are not limited to, exams, written assignments, and class participation.

SPECIAL NOTES:
This syllabus is subject to change at the discretion of the instructor. Material included is intended to provide an outline of the course and rules that the instructor will adhere to in evaluating the student’s progress. However, this syllabus is not intended to be a legal contract. Questions regarding the syllabus are welcome any time.

Kansas City Kansas Community College is committed to an appreciation of diversity with respect for the differences among the diverse groups comprising our students, faculty, and staff that is free of bigotry and discrimination. Kansas City Kansas Community College is committed to providing a multicultural education and environment that reflects and respects diversity and that seeks to increase understanding.
Kansas City Kansas Community College offers equal educational opportunity to all students as well as serving as an equal opportunity employer for all personnel. Various laws, including Title IX of the Educational Amendments of 1972, require the college’s policy on non-discrimination be administered without regard to race, color, age, sex, religion, national origin, physical handicap, or veteran status and that such policy be made known.

Kansas City Kansas Community College complies with the Americans with Disabilities Act. If you need accommodations due to a documented disability, please contact the Director of the Academic Resource Center at (913) 288-7670 V/TDD.