COURSE OUTLINE

CCNA I Internetworking Fundamentals

Course Description
IN 245. CCNA I Internetworking Fundamentals. 3 hours credit. Prerequisites: IN 133 with a C or better or instructor approval. This course will enable the student to use network protocol models to explain the layers of communications in data networks. The student will design, calculate, apply subnet masks and addresses to networks, and build a simple Ethernet network using routers and switches. The student will apply basic cabling and network designs to connect devices. The student will perform basic router and switch configuration and verification. The student will analyze the operations of the transport and network layer protocols and services within the Open Systems Interconnection (OSI) model.

Required Materials
Lammle. CCNA: Routing and switching. John Wiley and Sons, Inc.

LabSims. TestOut routing and switching pro. TestOut Corp.

* - For complete textbook information, refer to: https://bookstore.butlercc.edu

Butler-assessed Outcomes
The intention is for the student to be able to:
1. Demonstrate use of fundamental and advanced networking concepts.
2. Demonstrate familiarity with today’s networking architectures.

Learning PACT Skills that will be developed and documented in this course
Through involvement in this course, the student will develop ability in the following PACT skill area(s):

Technology Skills
- Discipline-specific technology - By applying skills learned, the student will use techniques to solve specific network design and performance problems.

Major Summative Assessment Task(s)
These Butler-assessed Learning Outcomes(s) and Learning PACT skills will be demonstrated by:
1. Completing TestOut Cisco Router Certification and TestOut Cisco Switching Certification.

Skills or Competencies
Actions that are essential to achieve the course outcomes:
1. Build a working network using current network architectures.
2. Illustrate the different network topologies.
3. Understand the data packet switching function of routers and switches.
4. Describe in detail how the Internet Protocol (IP) addressing encapsulation works and demonstrate the process of subnetting and supernetting.
5. Explain how the function of reliable data transmission over the network occurs.
6. Demonstrate the various data compression formats through examples.

Learning Units
I. Networks
   A. Introduction
   B. OSI model

II. Network devices
   A. Network hardware
   B. Ethernet operations

   A. Overview of the TCP/IP Protocol Suite
   B. Packet Frame transmission
   C. Cisco Three-Layer Hierarchical Model

IV. IP addressing
   A. Network address comparisons
   B. Subdividing IP classes
   C. Variable length subnet masks
   D. Hexadecimal numbers
   E. IPv4 versus IPv6

V. Router and IOS basics
   A. Cisco router user interface
   B. Router components

VI. Router startup and configuration
   A. Router startup
   B. IP on the router
   C. IP connectivity
   D. Cisco Internetwork Operating System (IOS)
   E. Security device manager

VII. Routing protocols
   A. Nonroutable protocols
   B. Routed protocols
   C. Routing protocols
   D. Routing Information Protocol (RIP)
   E. Interior Gateway Routing Protocol
   F. Static routing
VIII. Advanced routing protocols
   A. Classful and Classless Routing Protocols
   B. RIP version 2
   C. Enhanced Interior Gateway Routing Protocol
   D. Open shortest path first routing protocol and authentication
   E. Controlling route traffic

IX. Network services
   A. Network Address Translation (NAT)
   B. Configuring NAT
   C. Domain Name Service (DNS)
   D. Dynamic Host Configuration Protocol

X. Access lists
   A. Access lists: Usage and rules
   B. Standard IP access lists
   C. Extended IP access lists
   D. Named access lists

XI. Point-to-Point (PPP) and Frame Relay
   A. PPP
   B. Frame Relay standards and equipment
   C. Virtual circuits
   D. Performance parameters

XII. Basic switching and switch configuration
   A. Ethernet operations
   B. LAN Switching
   C. Switch User Interface

XIII. Advanced switching concepts
   A. Spanning Tree Protocol
   B. Virtual LANs

XIV. Network security
   A. General network security
   B. Mitigating security threats
   C. Virtual Private Networks (VPNs)
   D. Internet Protocol Security (IPSec)

Learning Activities
Independent and collaborative learning activities will be assigned to assist the student in achieving the intended learning outcomes. Learning activities will involve the student developing network topologies using learned techniques such as subnetting, variable subnet mask and network architectures. Lectures, discussions, lab projects, reading, research, quizzes and exams will prepare the student to successfully complete the major assessment tasks.
**Grade Determination**
The student will be graded on assessment tasks, quizzes, exams, labs, participation, timely completion of class exercises and tutorials, and other methods of evaluation at the discretion of the instructor.