

INFRASTRUCTURE OF THE INTERNET

Infrastructure of the Internet focuses on learning the fundamentals of networking, routing, switching and related protocols. In this course, students learn both the practical and conceptual skills that build the foundation for understanding basic networking, routing and switching. Students are introduced to the two major models used to plan and implement networks: OSI and TCP/IP. The OSI and TCP/IP functions and services are examined in detail. Students will learn how a router addresses remote networks and determines the best path to those networks, employing static and dynamic routing techniques.

- DOE Code: 4588
- Recommended Grade Level: Grade 11-12
- Recommended Prerequisites: Computer Tech Support
- Credits: 1-3 credits per semester, maximum of 2 semesters, maximum of 6 credits
- Counts as a Directed Elective or Elective for the General, Core 40, Core 40 with Academic Honors and Core 40 with Technical Honors diplomas
- This course is aligned with postsecondary courses for Dual Credit:
 - Ivy Tech
 - CINT 160 Cisco Exploration I
 - CINT 161 Cisco Exploration II
 - Vincennes University
 - CPNS 101 LAN Basics and OSI Model
 - CPNS 102 WAN Basics and Routers
 - **CPNS 150 Computer Telecommunications**

Dual Credit

This course provides the opportunity for dual credit for students who meet postsecondary requirements for earning dual credit and successfully complete the dual credit requirements of this course.

Application of Content and Multiple Hour Offerings

Intensive laboratory applications are a component of this course and may be either school based or work based or a combination of the two. Work-based learning experiences should be in a closely related industry setting. Instructors shall have a standards-based training plan for students participating in work-based learning experiences. When a course is offered for multiple hours per semester, the amount of laboratory application or work-based learning needs to be increased proportionally.

Career and Technical Student Organizations (CTSOs)

Career and Technical Student Organizations are considered a powerful instructional tool when integrated into Career and Technical Education programs. They enhance the knowledge and skills students learn in a course by allowing a student to participate in a unique program of career and leadership development. Students should be encouraged to participate in Business Professionals of America, DECA, or Future Business Leaders of America, the CTSOs for this area.

Content Standards

Domain – Bridging, Switching, and Routing

Core Standard 1 Students integrate network technologies using bridging, switching and routing to build fault tolerant networks.

Standards

- BTI-1.1 Use Command Line Interface commands to perform basic router and switch configuration and verification
- BTI-1.2 Describe classful and classless routing behavior in routed networks
- BTI-1.3 Compare and contrast classful and classless IP addressing
- BTI-1.4 Describe how metrics are used by routing protocols and identify the metric types used by dynamic routing protocols
- BTI-1.5 Describe the role of dynamic routing protocols and place these protocols in the context of modern network design
- BTI-1.6 Describe the purpose and procedure for configuring static routes
- BTI-1.7 Configure and verify router interfaces
- BTI-1.8 Describe the purpose and nature of routing tables
- BTI-1.9 Explain how a router determines a path and switches packets
- BTI-1.10 Explain the critical role that routers play in enabling communication across multiple networks
- BTI-1.11 Describe the purpose, nature, and operations of a router
- BTI-1.12 Build a simple Ethernet network using routers and switches

Domain – Open System Interconnect Reference Model & Layered Communications

Core Standard 2 Students analyze the Open System Interconnect (OSI) Model and Communication process in a network to verify communications.

Standards

- BTI-2.1 Analyze the operations and feature of the OSI model network layer protocols and services and explain the fundamental concepts of routing
- BTI-2.2 Analyze the operations and features of the OSI model transport layer protocols and services
- BTI-2.3 Describe the protocols and services provided by the application layer in the OSI model and describe how this layer operates in simple networks
- BTI-2.4 Explain how communication occurs in data networks and the Internet
- BTI-2.5 Describe the devices and services that support communication across an Internetwork

Domain – Network Protocols

Core Standard 3 Students validate appropriate applications to support data communication.

Standards

- BTI-3.1 Explain the role of physical layer protocols and services in supporting communications across data networks
- BTI-3.2 Describe the operation of protocols at the OSI data link layer and how they support communications
- BTI-3.3 Explain the role of protocols in data network communications
- BTI-3.4 Use network protocol models to explain the layers of communications that occur in data networks

Domain – WAN Protocols

Core Standard 4 Students evaluate Wide Area Network protocols for optimizing network performance.

Standards

- BTI-4.1 Describe the purpose, nature, and operation of OSPF

- BTI-4.2 Apply basic RIPv2 configuration commands and evaluate classless routing updates
- BTI-4.3 Use advanced configuration commands with routers implementing EIGRP
- BTI-4.4 Describe the main features and operation of the Enhanced Interior Gateway Routing Protocol (EIGRP)
- BTI-4.5 Describe the basic features and concepts of link-state routing protocols
- BTI-4.6 Demonstrate comprehensive RIPv1 configuration skills
- BTI-4.7 Describe the functions, characteristics, and operation of RIPv1
- BTI-4.8 Describe the network discovery process of distance vector routing protocols using Routing Information Protocol (RIP)
- BTI-4.9 Identify the characteristics of distance vector routing protocols
- BTI-4.10 Demonstrate comprehensive RIPv1 configuration skills

Domain – Network Management

Core Standard 5 Students prove essential network management skills to manage an efficient network.

Standards

- BTI-5.1 Design, calculate, and apply an appropriate addressing scheme to fulfill given requirements
- BTI-5.2 Describe the importance of addressing and naming schemes at various layers of data networks
- BTI-5.3 Design and implement a classless IP addressing scheme for a given network