# **Computer Communications and Networks**

* [Unit 1: Networking Fundamentals](https://learn.saylor.org/course/view.php?id=84&sectionid=15675)

This unit will introduce the basic concept of a computer network and arm you with the tools you will need to work through the more technical aspects of this course. You will take a look at the different types of networks that exist, with the primary focus on the LAN. The unit continues with an introduction to the concept of layers, which is central to understanding how computer networks operate. You will also become familiar with Request for Comments (RFC) documents, which are standards that define all of the Internet protocols. RFCs are created by The Internet Engineering Task Force (IETF).

The concepts presented in this course will provide you with the background information needed to develop network applications, take a network certification course, or communicate with other networks neighboring your LAN.

**Completing this unit should take you approximately 4 hours.**

* [Unit 2: The Basics of Protocols](https://learn.saylor.org/course/view.php?id=84&sectionid=15676)

In life, protocols define the way we interact with other people – for example, the way we behave in a public place. In computer science, protocols are formal sets of rules that dictate the ways in which computers communicate with one another over a network medium. Protocols constitute the backbone of networking. The standard model for networking protocols and distributed applications is the International Standard Organization's Open System Interconnect (ISO/OSI) model. The Internet protocol stack TCP/IP (Transmission Control Protocol/Internet Protocol) model presents a group of protocols optimized for inter-computer communications and in particular for communications between multiple applications that may run on one computer. This unit provides an overview of the TCP/IP stack and its different layers, identifies the function of each layer, introduces the basics of how computers talk to one another in cyberspace using TCP/IP protocols, describes the techniques for wide area networks, and discusses common transmission media for the Internet.

**Completing this unit should take you approximately 2 hours.**

* [Unit 3: The Application Layer](https://learn.saylor.org/course/view.php?id=84&sectionid=15677)

In this unit, we will examine the application layer of the TCP/IP stack. The application layer is where all network processes and applications run. We will explore five of this layer's prominent applications: the Domain Name System (DNS), e-mail protocols, the World Wide Web's Hypertext Transfer Protocol (HTTP), Simple Network Management Protocol (SNMP), and Secure Shell (SSH). Finally, we will discuss socket programming and how it can be used to develop network applications.

**Completing this unit should take you approximately 6 hours.**

* [Unit 4: The Transport Layer (TCP/UDP)](https://learn.saylor.org/course/view.php?id=84&sectionid=15678)

When we talk about networks, we are talking about data transport. The TCP/IP stack provides a TCP/UDP layer that handles the data transport between machines across networks. In this unit, you will learn the TCP and UDP protocols by examining the structure of TCP and UDP segments and identifying how this layer serves as the application layer in the TCP/IP stack.

Each application relies on the transport layer that is described in this unit. It is a key layer in today's networks as it contains all the mechanisms necessary to provide reliable delivery of data over an unreliable network. First, we will develop a simple reliable transport layer protocol. Then, your textbook links you through the details of the TCP and UDP protocols used in TCP/IP networks. We will also study Stream Control Transmission Protocol (SCTP) and Real-Time Transport Protocol (RTP), which are not covered by the textbook. These protocols are the fundamental protocols for modern multimedia applications over the Internet.

**Completing this unit should take you approximately 6 hours.**

* [Unit 5: The Network Layer](https://learn.saylor.org/course/view.php?id=84&sectionid=15679)

In this unit, we will learn how packets (groupings of data) travel on a network and how each machine can be addressed uniquely so that data transport between two nodes is reliable. We will learn that networks can run out of space, meaning that unique addresses for different machines are no longer available. In these situations, computer scientists must manage IP addressing using CIDR and subnetting – techniques we will learn about in this unit.

The network layer is responsible for the delivery of packets from any source to any destination through intermediate routers. Follow the links to explore in detail the IPv4, IPv6, RIP, OSPF, and BGP protocols used in today's Internet.

**Completing this unit should take you approximately 11 hours.**

* [Unit 6: The Link Layer](https://learn.saylor.org/course/view.php?id=84&sectionid=15680)

The final layer of the TCP/IP protocol stack that you will learn in this course is known as the link layer. This unit will explain how you can address machines on a network from that layer, use IP addresses to determine physical addresses, and identify the different mechanisms in the link layer that can correct packet collisions when data is transferred over the wire.

This unit guides you through the principles of the link layer. Then the textbook will direct your focus to computer networks with a discussion of how multiple hosts share one transmission medium. The chapter ends with a detailed discussion of the two types of computer networks that are important today from a deployment perspective: Ethernet and Wi-Fi.

**Completing this unit should take you approximately 7 hours.**

* [Unit 7: Multimedia, Security, and Cloud Computation over the Internet](https://learn.saylor.org/course/view.php?id=84&sectionid=15681)

Multimedia over the Internet becomes more and more popular. This unit guides you through the protocols for transmitting multimedia content, such as voice and video, over the Internet, and discusses security, reliability, and fault tolerance issues related to Internet applications. You will also be introduced to one of the most recent Internet-based technologies: cloud computation, and we will briefly discuss network remote access and directory services.

**Completing this unit should take you approximately 6 hours.**