

# **ET225P**

## **Networking Concepts**

### **[Onsite]**

**Course Description:**

Computer network and internetworking concepts, such as standards, topology, models, protocols, devices, operating systems and applications, will be explored. Students will have the opportunity to assemble a simple computer network and test its operations.

**Prerequisite(s) and/or Corequisite(s):**

Prerequisites: TB143P Introduction to Personal Computers

**Credit hours: 4**

**Contact hours: 66 (46 Theory Hours, 20 Lab Hours)**

## Syllabus: Networking Concepts

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Instructor: _____
Office hours: _____
Class hours: _____

### Major Instructional Areas

1. Introduction to networking
2. OSI and TCP/IP models
3. Basics of data communications
4. Basics of LAN and WAN technology
5. Internetworking

### Course Objectives

1. Define selected essential networking criteria and components.
2. Describe common network devices and their functions.
3. Identify the proper role and implementation of network standards
4. Explain why protocols are needed in communications systems.
5. Explain how data is coded when transmitted in a network.
6. Describe the function and characteristics of data link control protocols.
7. Analyze the protocols and hardware used by local area networks (LANs).
8. Compare and contrast LAN systems.
9. Demonstrate the installation and operation of a wireless LAN.
10. Summarize the characteristics and capabilities of a Wide Area Network (WAN).

- 11: Analyze the historical development of the Internet, select Internet applications and communication protocols.
- 12: Describe the various threats to network security and the technologies that are used to counter those threats.
- 13: Describe the design, implementation, and management of networks.
- 14: Describe the transmission of data in an analog and digital environment, including associated media that supports data transmission and that media's attributes.

## SCANS Objectives

SCANS is an acronym for Secretary's Commission on Achieving Necessary Skills. The committee, created by the National Secretary of Labor in the early 1990s, created a list of skills and competencies that the committee feels are necessary for employees to function in a high-tech job market.

1. Identify relevant facts and analyze information in a logical manner after locating and verifying information using resources and computers.
2. Identify common goals and examine all possible options for problem solving.
3. Identify problems, create and implement solutions, and revise solutions as required.
4. Allocate time and energy for completing projects in a timely manner.
5. Exert a high level of effort and perseverance toward attaining goals.
6. Recognize problems and devise and implement a plan of action.
7. Demonstrate the ability to utilize authentic resources available, including the Internet, knowledge libraries, or other sources.
8. Locate, understand, and interpret information obtained from a variety of sources.
9. Identify the need for data; select, retrieve, and analyze information; and communicate the results of information analysis in written, graphical, and pictorial formats.
10. Compare and contrast two theories or alternatives to arrive at the best solution.
11. Apply procedures, tools, and equipment—including computers and related technologies—whenever required.
12. Evaluate alternatives and choose the best for a situation.

## Course Outline

Note: All graded activities, except the Final Exam, are listed below in the pattern of <Unit Number>.<Assignment Number>. For example, Lab 4.2 refers to the 2nd lab activity in Unit 4.

Unit	Activities
1–  Network Introduction, Overview, and Classification	<ul style="list-style-type: none"> <li>• Content Covered:               <ul style="list-style-type: none"> <li><i>Computer Networking</i> <ul style="list-style-type: none"> <li>○ Chapter 1, “Introduction and Overview”</li> <li>○ Chapter 2, “Network Classification”</li> </ul> </li> </ul> </li> <li>• Assignments: 1.1, 1.2</li> <li>• Labs: 1.1, 1.2, 1.3</li> </ul>
2–  Network Architecture and Standards	<ul style="list-style-type: none"> <li>• Read from <i>Computer Networking</i>:               <ul style="list-style-type: none"> <li>○ Chapter 3, “Network Architectures and Standards”</li> <li>○ Chapter 4, “Introduction to Protocols”</li> </ul> </li> <li>• Assignments: 2.1, 2.2</li> <li>• Labs: 2.1, 2.2, 2.3</li> </ul>
3–  Data Coding and Data Communication Fundamentals	<ul style="list-style-type: none"> <li>• Read from <i>Computer Networking</i>:               <ul style="list-style-type: none"> <li>○ Chapter 5, “Data Coding”</li> <li>○ Chapter 14, “Internetworking”</li> </ul> </li> <li>• Quizzes: 3.1</li> <li>• Assignments: 3.1, 3.2</li> <li>• Labs: 3.1, 3.2, 3.3</li> </ul>
4–  Data Link Control Protocols and	<ul style="list-style-type: none"> <li>• Read from <i>Computer Networking</i>:               <ul style="list-style-type: none"> <li>○ Chapter 7, “Data Link Control Protocols”</li> </ul> </li> </ul>

Unit	Activities
Transmission Media	<ul style="list-style-type: none"> <li>○ Chapter 18, "Network Design And Implementation" pp. 531-573</li> <li>• Assignments: 4.1</li> <li>• Labs: 4.1, 4.2, 4.3</li> </ul>
5– Local Area Networks and Systems	<ul style="list-style-type: none"> <li>• Read from <i>Computer Networking</i>: <ul style="list-style-type: none"> <li>○ Chapter 10, "Local Area Networks (LANs)"</li> <li>○ Chapter 11, "LAN Systems"</li> </ul> </li> <li>• Assignments: 5.1</li> <li>• Labs: 5.1, 5.2, 5.3</li> <li>• Project: Part 1 Assigned</li> </ul>
6– LAN Installation and Operation	<ul style="list-style-type: none"> <li>• Read from <i>Computer Networking</i>: <ul style="list-style-type: none"> <li>○ Chapter 12, "LAN Installation and Operation"</li> <li>○ Chapter 18, "Network Design And Implementation," pp. 520-531</li> </ul> </li> <li>• Quizzes: 6.1</li> <li>• Assignments: 6.1</li> <li>• Labs: 6.1 and 6.2</li> </ul>
7– Wide Area Networking and Internetworking	<ul style="list-style-type: none"> <li>• Read from <i>Computer Networking</i>: <ul style="list-style-type: none"> <li>○ Chapter 13, "Wide Area Networks (WANs)"</li> <li>○ Chapter 14, "Internetworking"</li> </ul> </li> <li>• Assignments: 7.1</li> <li>• Labs: 7.1, 7.2</li> <li>• Project: Part 1 Due w/ SOW</li> <li>• Project: Part 2 Assigned</li> </ul>

Unit	Activities
8–  The Internet and Applications	<ul style="list-style-type: none"> <li>• Read from <i>Computer Networking</i>:               <ul style="list-style-type: none"> <li>○ Chapter 15, “The Internet”</li> <li>○ Chapter 16, “Internet Applications”</li> </ul> </li> <li>• Assignments: 8.1</li> <li>• Labs: 8.1, 8.2, 8.3</li> </ul>
9–  Network Security, Design, and Implementation	<ul style="list-style-type: none"> <li>• Read from <i>Computer Networking</i>:               <ul style="list-style-type: none"> <li>○ Chapter 17, “Network Security”</li> <li>○ Chapter 19, “Network Management and Operation”</li> </ul> </li> <li>• Quizzes: 9.1</li> <li>• Assignments: 9.1</li> <li>• Labs: 9.1, 9.2</li> <li>• Project: Part 2 Due w/ DRP</li> <li>• Project: Part 3 Assigned</li> </ul>
10–  Analog/ Digital Transmission and Media	<ul style="list-style-type: none"> <li>• Read from <i>Computer Networking</i>:               <ul style="list-style-type: none"> <li>○ Chapter 6, “Data Communication Fundamentals”</li> <li>○ Chapter 8, “Transmission Media”</li> </ul> </li> <li>• Labs: 10.1</li> <li>• Project: Part 3 Final Draft Review w/ Instructor</li> </ul>
11–  Course Review and Final exam	<ul style="list-style-type: none"> <li>• Project: Part 3 Final Draft Due</li> <li>• Course Review</li> <li>• Final Exam</li> </ul>

## Instructional Methods

The course will cover the fundamentals of computer networking theories and practices. You will examine networks from the perspectives of their purposes, methods, components, topology, features, functions, capabilities, specifications, and limitations, with industry standards and practices as the guidelines for analysis and applications. This course will address basic knowledge mainly associated with the lower four (Physical, Data Link, Network, and Transport) layers of the OSI model with a focus on the IP network infrastructure.

This course will deploy a series of lab activities to allow you to visualize invisible network activities and to monitor such activities with certain tools. Wherever applicable, paper and pencil activities will be employed to expose you to the necessary methods of calculating and planning of IP addresses using subnet masks. Simple network configuration and troubleshooting activities are incorporated with basic tools.

## Instructional Materials and References

### Student Textbook Package

- Rowe, Stanford H., and Marsha L. Schuh. *Computer Networking*. Upper Saddle River, NJ: Pearson Prentice Hall, 2009.

### References

#### ITT Tech Virtual Library

Log on to the ITT Tech Virtual Library at <http://www.library.itt-tech.edu/> to access online books, journals, and other reference resources selected to support ITT Tech curricula.

#### Books

You may click “Books” or use the “Search” function on the home page to find the following books.

ITT Tech Virtual Library> Main Menu> Books> Books24x7>

- Bing, Benny, ed. *Emerging Technologies in Wireless LANs: Theory, Design, and Deployment*. New York: Cambridge University Press, 2008.
- Prasad, K.V. *Principles of Digital Communication Systems and Computer Networks*. Hingham, MA: Charles River Media, 2003.

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- Green, James Harry. *Irwin Handbook of Telecommunications 4/E*. New York: McGraw-Hill Companies, 2000.
- Karris, Stephen. *Networks: Design and Management*. Fremont, CA: Orchard Publications, 2004.

## Course Evaluation and Grading

### Evaluation Criteria Table

The final grades will be based on the following categories:

CATEGORY	WEIGHT
Assignments	20%
Labs	30%
Project, Part 1	5%
Project, Part 2	5%
Project, Part 3	10%
Quizzes	15%
Final Exam	15%
<b>Total</b>	<b>100%</b>

Note: Students are responsible for abiding by the Plagiarism Policy.

### Grade Conversion Table

The final grades will be calculated from the percentages earned in the course, as follows:

A	90-100%	4.0
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B+	85-89%	3.5
B	80-84%	3.0
C+	75-79%	2.5
C	70-74%	2.0
D+	65-69%	1.5
D	60-64%	1.0
F	<60%	0.0