ITT Technical Institute

ET385

Data and Network Communications

Onsite Course

SYLLABUS

Credit hours: 4

Contact/Instructional hours: 50 (30 Theory Hours, 20 Lab Hours)

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

Prerequisite: IT220 Network Standards and Protocols or equivalent

Course Description:

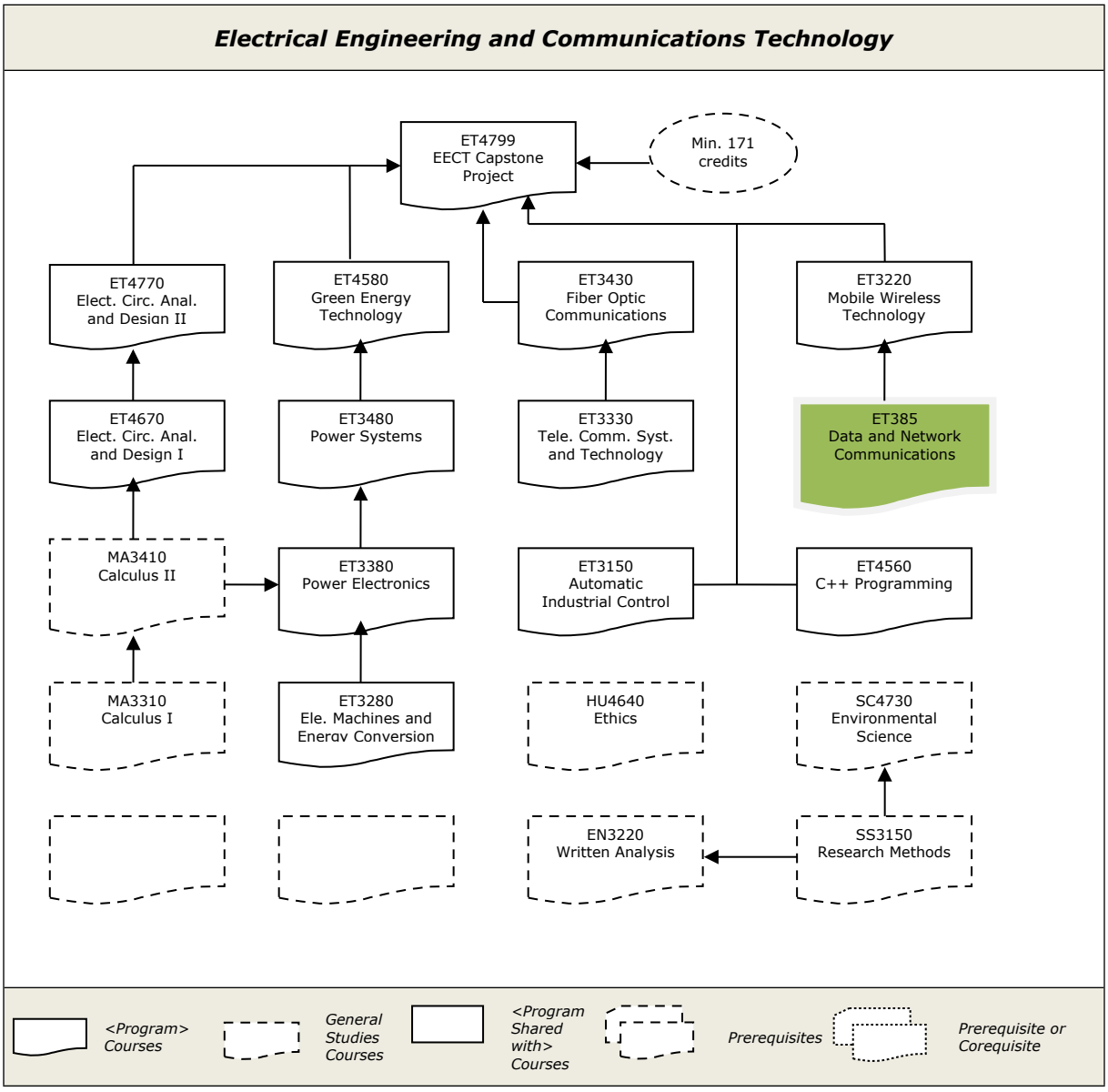
This course involves the study of data communication and its application in computer-based network systems, including basic principles of data and computer communications, communication architecture, protocols and standards.

Where Does This Course Belong?

This course is required for the Electrical Engineering and Communications Technology (EECT) program. This program covers the following core areas:

1. Process control
2. Embedded systems
3. Electronic circuit analysis and design
4. Data and network communications
5. Telecommunications and mobile wireless technology
6. Fiber optic communications
7. Electrical machines and energy conversion
8. Power electronics and power systems
9. Green energy technology
10. Computer programming

The following diagram demonstrates how this course fits in the program:



NOTE: Refer to the catalog for the state-specific course information, if applicable.

Course Summary

Major Instructional Areas

1. Data communication model, components and services
2. TCP/IP protocol architecture and network communications
3. Error and line control techniques
4. Ethernet local area networks (LANs)
5. Packet switching and congestion control
6. Internet and routing protocols
7. Concepts of multiprotocol label switching
8. Computer network security
9. Computer network setup and performance evaluation

Course Objectives

1. Discuss the general model of data communications, the TCP/IP protocol architecture, and specifications.
2. Describe the various techniques involved with Data Link control protocols.
3. Identify Ethernet LAN standards and various configurations.
4. Contrast circuit and packet switching and the methods used to control congestion in data networks.
5. Describe the operation of Internet Protocol.
6. Discuss routing in packet switching networks and routing protocols.
7. Identify the TCP mechanism required to support connection-oriented services.
8. Identify the MPLS network operation and specifications.
9. Discuss computer and network security concepts.
10. Evaluate the methods used to secure a network.
11. Summarize methods used to set up and evaluate a computer network.

Learning Outcomes

Upon completion of this course, students are expected to:

1. Describe the communication model and the need for the TCP/IP protocol architecture.
2. Demonstrate flow and error control methods and techniques.
3. Demonstrate Ethernet LAN specifications and applications.
4. Identify the effects of congestion and describe the management of traffic of a data network.

5. Describe the Internet Protocol specifications.
6. Analyze the routing protocol functions.
7. Describe the transport protocol services, header format, and applications.
8. Analyze the elements of MPLS traffic engineering and its applications in virtual private networks (VPNs).
9. Analyze computer and network security threats.
10. Identify the need for encryption and the features of IPSec services.
11. Demonstrate various basic techniques for setting up and evaluating a computer network.

Learning Materials and References

Required Resources

Textbook Package	New to this Course	Carried over from Previous Course(s)	Required for Subsequent Course(s)
Stallings, W. (2011). *Data and Computer Communications*. (9th ed.) Upper Saddle River, NJ: Prentice Hall.	■		
Other Items	**New to this Course**	**Carried over from Previous Course(s)**	**Required for Subsequent Course(s)**
Textbook Powerpoints and Animations	■		
USB external hard drive	■		
ELCT Student Toolkit		■	
EECT Student Toolkit	■		

Recommended Resources

Books, Professional Journals

- Forouzan, B. A. (2007). *Data communications and networking* (4th ed.). New York, NY: McGraw-Hill.
- Panko, R. & Panko, J. (2011). *Business Data Communications and Networking* (8th ed.). Upper Saddle River, NJ: Pearson Prentice Hall.
- Tanenbaum, A. S., & Wetherall, D. J. (2011). *Computer networks* (5th ed.). Upper Saddle River, NJ: Pearson Prentice Hall.

Professional Organizations

You can access the Web sites of these relevant professional organizations from the ITT Tech Virtual Library: ITT Tech Virtual Library> School of Study> School of Electronics Technology> Professional Organizations

- Electronics Industry Alliance
- IEEE Computer Society
- IEEE: Institute of Electrical and Electronics Engineers
- Telecommunications Industry Association
- United Telecom Council
- Women in Technology International (WITI)

Web sites

- Institute of Electronics, Information and Communication Engineers (IEICE) http://www.ieice.org/eng/index.html

Established in 1917, the IEICE is works for the investigation and exchange of knowledge on the science and technology of electronics, information, and communications, and contributes to the progress of technologies and to the development of industries.

NOTE: All links are subject to change without prior notice.

Information Search

Use the following keywords to search for additional online resources that may be used for supporting your work on the course assignments:

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- TCP/IP protocols
- Flow control
- Error control
- Ethernet LAN
- Packet switching
- Congestion control
- Mobile IP
- Connection oriented
- MPLS
- VPN
- Computer network security

Course Plan

Suggested Learning Approach

In this course, you will be studying individually and within a group of your peers. As you work on the course deliverables, you are encouraged to share ideas with your peers and instructor, work collaboratively on projects and team assignments, raise critical questions, and provide constructive feedback.

Use the following advice to receive maximum learning benefits from your participation in this course:

DO	DON'T
▪ Do take a proactive learning approach. ▪ Do share your thoughts on critical issues and potential problem solutions. ▪ Do plan your course work in advance. ▪ Do explore a variety of learning resources in addition to the textbook. ▪ Do offer relevant examples from your experience. ▪ Do make an effort to understand different points of view. ▪ Do connect concepts explored in this course to real-life professional situations and your own experiences.	▪ Don't assume there is only one correct answer to a question. ▪ Don't be afraid to share your perspective on the issues analyzed in the course. ▪ Don't be negative about the points of view that are different from yours. ▪ Don't underestimate the impact of collaboration on your learning. ▪ Don't limit your course experience to reading the textbook. ▪ Don't postpone your work on the course deliverables – work on small assignment components every day.

Course Outline

Unit #	Unit Title	Grading Category	Activity/Deliverable Title	Grade Allocation (% of all graded work)
1	Data Communications Model and TCP/IP Protocol Architecture	Discussion	Unit 1. Discussion 1. Summarizing Data Communications Model and TCP/IP Protocol Architecture	1%
		Assignment	Unit 1. Assignment 1. Synthesizing Data Communications Model and TCP/IP Protocol Architecture	1%
		Lab	Unit 1. Lab 1. Internet Connectivity	3%
		Project (Designated PORTFOLIO assignment)	Project Part 1: ITT Technical Institute Existing Computer Network Specifications	1%
Unit 1 Reading Assignment: Stallings pp. 8-31 and 32-61 (Chapters 1 and 2)				
2	Communication Techniques and Data Link Control Protocol	Discussion	Unit 2. Discussion 1. Summarizing Communication Techniques and Data Link Control Protocol	1%
		Assignment	Unit 2. Assignment 1. Synthesizing Communication Techniques and Data Link Control Protocol	1%
		Lab	Unit 2. Lab 1. Sliding-Window Protocol Simulator	1%
			Unit 2. Lab 2. RS-232 Break-Out Box	2%
		Project	Project Part 2: Data Link Requirements	1%
Unit 2 Reading Assignment: Stallings pp. 180-201 and 208-230 (Chapters 6 and 7)				
3	Ethernet Local Area Networks	Discussion	Unit 3. Discussion 1: CSMA/CD (Ethernet) Protocol Simulator	1%
		Assignment	Unit 3. Assignment 1. Synthesizing Ethernet Local Area Networks	1%
		Lab	Unit 3. Lab 1. Ethernet Switch Set-Up and VLANs	3%
		Project	Project Part 3: VLAN Proposal	1%
Unit 3 Reading Assignment: Stallings pp. 442-473 and 477-499 (Chapters 15 and 16)				
4	Circuit Switching, Packet Switching, and Congestion Control	Discussion	Unit 4. Discussion 1. Summarizing Circuit Switching, Packet Switching, and Congestion Control	1%
		Assignment	Unit 4. Assignment 1. Circuit Switching, Packet Switching, and Congestion Control	1%
		Lab	Unit 4. Lab 1. Evaluating WAN Performance	3%
		Project	Unit 4. Project Part 4: WAN Link	1%

Unit #	Unit Title	Grading Category	Activity/Deliverable Title	Grade Allocation (% of all graded work)
			Proposal	
Unit 4 Reading Assignment: Stallings pp. 298-320, 377 -388 (Chapters 10 and 13)				
5	Internet Protocols	Discussion	Unit 5. Discussion 1. Summarizing Internet Protocols	1%
		Assignment	Unit 5. Assignment 1. Synthesizing Internet Protocols	1%
		Lab	Unit 5. Lab 1. Internet Network Protocol Analysis using Wireshark	3%
		Project	Project Part 5: The Protocol Analyzers	1%
Unit 5 Reading Assignment: Stallings pp. 545-580 (Chapter 18)				
6	Routing Protocols	Discussion	Unit 6. Discussion 1. Summarizing Routing Protocols	1%
		Assignment	Unit 6. Assignment 1. Synthesizing Routing Protocols	1%
		Exam	Midterm Exam	10%
		Lab	Unit 6. Lab 1. Routing Protocols	3%
		Project	Project Part 6: Catch-up Time	0%
Unit 6 Reading Assignment: Stallings pp. 351-372, 596-607, and 652-654 (Chapters 12, 19, and 20)				
7	Transport Protocols	Discussion	Unit 7. Discussion 1. Summarizing Transport Protocols	1%
		Assignment	Unit 7. Assignment 1. Synthesizing Transport Protocols	1%
		Lab	Unit 7. Lab 1. TCP and UDP Simulators	1%
			Unit 7 Lab 2. Transport Protocol Analysis Using Wireshark	2%
		Project	Project Part 7: Wireshark as a Troubleshooting Tool	1%
Unit 7 Reading Assignment: Stallings pp. 693-732 (Chapter 22)				
8	Multiprotocol Label Switching (MPLS)	Discussion	Unit 8. Discussion 1. Summarizing MPLS	1%
		Assignment	Unit 8. Assignment 1. Synthesizing MPLS	1%
		Lab	Unit 8.Lab 1. MPLS with VPN	3%
		Project	Project Part 8: Remote Connection	1%
Unit 8 Reading Assignment: Stallings pp. 662-689 (Chapter 21)				
9	Computer and Network Security Threats	Discussion	Unit 9. Discussion 1. Summarizing Computer and Network Security Threats	1%
		Assignment	Unit 9. Assignment 1. Synthesizing	1%

Unit #	Unit Title	Grading Category	Activity/Deliverable Title	Grade Allocation (% of all graded work)
			Computer and Network Security Threats	
		Lab	Unit 9. Lab 1. Computer Security Evaluation Using Microsoft Baseline Analyzer	3%
		Project	Project Part 9: ITT Technical Institute Network Security Evaluation Report	1%
Unit 9 Reading Assignment: Stalling pp. 738-764 (Chapter 23)				
10	Computer and Network Security Techniques	Discussion	Unit 10. Discussion 1. Summarizing Computer and Network Security Techniques	1%
		Assignment	Unit 10. Assignment 1. Synthesizing Computer and Network Security Techniques	1%
		Lab	Unit 10. Lab 1. Virtual Private Network (VPN)	2%
			Unit 10. Lab 2. Firewall	1%
		Project	Project Part 10: ITT Technical Institute Computer Network Improvement Proposal	1%
Unit 10 Reading Assignment: Stalling pp. 768-796 (Chapter 24)				
11	Review and Final Exam	Exam	Unit 11. Exam 2	15%
		Project (Designated PORTFOLIO assignment)	Project Part 11: Formal Presentation	16%
Unit 11 Reading Assignment: Review Stallings Chapters 1, 2, 6, 7, 10, 12, 13, 15, 16, 18-24				

Evaluation and Grading

Evaluation Criteria

The graded assignments will be evaluated using the following weighted categories:

Category	Weight
Assignments	10%
Labs	30%
Project	25%
Discussion	10%
Exams	25%
TOTAL	**100%**

Grade Conversion

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

Grade	Percentage	Credit
A	90–100%	4.0
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

Academic Integrity

All students must comply with the policies that regulate all forms of academic dishonesty, or academic misconduct, including plagiarism, self-plagiarism, fabrication, deception, cheating, and sabotage. For more information on the academic honesty policies, refer to the Student Handbook and the Course Catalog.

(End of Syllabus)