

ITN 100 (D01A)
Introduction to Telecommunications
Course Syllabus

Instructor	Jeffrey Elkner
Session	Fall 2019
Meeting Days	M-F
Time	8:00 - 9:30 am
Location	Arlington Career Center Room
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Course Description:

Surveys data transmission systems, communication lines, data sets, network, interfacing, protocols, and modes of transmission. Emphasizes network structure and operation.

General Course Purpose:

This course provides a comprehensive foundation in the principles and practices of telecommunications. It provides an overview of communications technologies, standards and protocols. Students will learn the basics of internet and its operation. It also provides students with an understanding of communication administration, digital audio and video. This knowledge is expected from any network or IT professional.

Course Prerequisites/Co-Requisites:

Prerequisite or corequisite: ITE 115

Course Objectives:

Upon completing the course, the student will be able to:

1. Identify modern communications and network trends.
2. Explain the various data transmission media to include both analog and digital transmission and data coding techniques.
3. Explain networking protocols at all layers of the OSI model and their operation.
4. Explain major line sharing techniques (i.e. circuit sharing and packet sharing).
5. Identify the issues regarding local area networks to include topology and network protocols.
6. Explain data communication techniques used to facilitate decentralization of data processing.
7. Identify the important elements of data communications equipment and describe their function.
8. Explain the OSI 7-layer model for standards development.
9. Explain Internet technology.
10. Understand digital image and audio processing techniques.

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Major Topics to be Included:

1. Communication system and OSI model
2. The business environment
3. Data communication codes and transmission media
4. Communication interface and modem
5. Communication networks
6. Line sharing
7. Protocols
8. Digital and analog signal transmission
9. Communication Administration
10. Internet Basics
11. Internet operation and addressing
12. Digitizing grayscale and color images
13. Digital video
14. Digital audio

Student Outcomes:

Communication Systems and the OSI Model

- Explain the OSI reference model and layers.
- Discuss the TCP/IP layers and similarities to OSI.
- Explain the OSI layer functions and purpose.
- Explain message transmission and message type.
- Describe communication basic components.
- Explain signal and systems, and signal propagation.
- Describe the different vehicles of transmission.
- Explain transmission basics in relation to reference model.
- Define and explain distributed processing and distributed network.
- Explain distributed forms of computing (vertical and horizontal).
- Discuss centralized processing and its applications.
- Introduce the evolution of modern communications systems.
- Discuss several business data communication issues and efficiency.
- Distinguish between analog and digital data and signals.

The Business Environment

- Describe the importance and characteristics of information.
- Explain the impact of telecommunications on the business environment.
- Discuss the application of telecommunications in business communities and organizations.

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Data Communication Codes and Transmission Media

- Explain different types of coding schemes.
- Describe Data Encoding Schemes.
- Explain decoding format, error checking, parities and control characters.
- Explain various transmission media types, including guided and unguided (microwave, satellite, and radio frequency).
- Explain the characteristics and functions of twisted pair, coaxial cable and fiber optics.
- Explain fiber optics transmission characteristics.
- Explain the various transmission impairments that affect the signal and the transfer rate.
- Define bandwidth and its relation to pulse width.
- Define frequency domain analysis.

Communication Interfaces and Modems

- Explain interfacing methods(i.e. modems and CSU/DSUs).
- Identify and explain the different types of modulation techniques used today.

Communication Networks

- Explain different network architectures.
- Discuss circuit switched and packet switched networks.
- Explain various topologies and configurations used in networks such as: Star, Ring, Bus and Tree.
- Explain Local Area Networks, their access methods and interconnection types.
- Give examples of LAN applications.
- Define and explain Wide Area Networks.
- Describe Cellular Communications.
- Describe Satellite communication systems.
- Explain channel capacity and its impact on data transmission.
- Explain data rate, and data transfer rate, and their effects on data transmission.
- Explain digital transmission systems, such as T-carrier and optical carrier (OC) networks.

Line Sharing

- Discuss various multiplexing technologies.
- Explain major line sharing techniques (i.e. circuit sharing and packet sharing).

Protocols

- Describe the basic operation of common network protocols used in the OSI layers.

Digital and Analog Signal Transmission

- Describe digital signal transmission and encoding.
- Describe analog signal transmission and forms of encoding.
- Explain the difference between synchronous and asynchronous data transmission.

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Communication Administration

- Describe ways that messages are routed within a network.
- Describe the functions of the network operation.
- Describe how network performance is monitored and measured.
- Explain the importance of system, network, and cybersecurity.
- List the common security threats to communication networks.
- Discuss the application of encryption to communications and system security.
- Discuss telecommunications policy and governance.

Internet Basics

- Explain Internet technology.
- Explain Internet Protocol and services.
- Explain the features of client server computing.
- Explain the architecture of client server applications.

Internet Operation and Addressing

- Discuss Internet Addressing.
- Describe subnets and their usage.
- Discuss IP routing algorithms and protocols.
- Explain the role of subnet mask in IP addressing.

Digitizing Grayscale and Color images

- Describe brightness resolution.
- Describe spatial resolution.
- Describe the image digitization process.
- Identify trade offs involved in digitizing images.
- Perform calculations involving images.

Digital Video

- Describe the process of creating digital video.
- Calculate the size of digital video files.

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Digital Audio

- Describe the conversion of sound into electricity.
- Describe frequency, amplitude and phase.
- Perform calculations involving properties of sound waves.
- Describe multipliers for frequency and period.
- Define complex tones and pure tones.
- Describe frequency spectrum of audio signals.
- Describe the 3 steps for digitizing audio.
- Define Nyquist sampling theorem.
- Describe PCM.
- Describe Quantization error.
- Describe construction of audio signals from binary streams.
- Analyze trade offs involved in audio digitization.
- Perform calculations involving digital audio files.

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Required Time Allocation per Topic

The following table has the breakdown of the time in this course that will be spent on each course topic:

Topic	Hours	Percentage
Communication systems and the OSI model	6	13.3%
The business environment	1	2.2%
Data communication codes and transmission media	4	8.9%
Communication interface and modems	2	4.4%
Communication networks	6	13.3%
Line sharing	2	4.4%
Protocols	3	6.7%
Digital and analog signal transmission	2	4.4%
Communication Administration	4	8.9%
Internet Basics	2	4.4%
Internet operation and addressing	2	4.4%
Digitizing grayscale and color images	2	4.4%
Digital video	2	4.4%
Digital audio	2	4.4%
Other optional content	2	4.4%
Exams and Quizzes (NOT including final exam)	3	6.7%
Total:	45	100%

Required Instructional Materials:

- Business Data Communications and Networking, 11th Edition, by Jerry Fitzgerald, Alan Dennis, and Alexandra Durcikova. Available through [NVCC Safari Books Online](#).

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Course Credit: 3 Credits

Policies:

I. Grading Policies

- a. Grading Scale
A= 100 - 90 B= 89 - 80 C= 79 - 70 D=69 - 60 F= 59 and below
- b. Students will receive a weekly holistic letter grade that will incorporate classwork, quizzes, tests, projects, and presentations. These weekly evaluations can be challenged by the student, *but only during the week immediately following when the evaluation is given.*
- c. The average of the weekly evaluations will make up 70% of the final grade, with the course final exam making up 30%.
- d. In cases where district grading policies conflict with college grading policies, the high school and college grades may differ; this may include assignment/test retakes, extended assignment due dates, capped minimum grade allowed, among other such district policies.
- e. It is important that students check their final NOVA grades in Blackboard as soon as the course(s) completed.

II. Course Policies

- a. **Academic Integrity**
 - i. The College does not tolerate academic dishonesty. Students who are not honest in their academic work will face disciplinary action along with any grade penalty the instructor imposes. Procedures for disciplinary measures and appeals are outlined in the Student Handbook (<http://www.nvcc.edu/students/handbook/>). In extreme cases, academic dishonesty may result in dismissal from the College.
 - ii. **Plagiarism:** is the act of appropriating passages from the work of another individual, either word for word or in substance, and representing them as one's own work. This includes any submission of written work other than one's own. In short, plagiarism means using the exact words, opinions, or factual information from another person without giving that person credit. Students who are not honest in their academic work will face disciplinary action along with any grade penalty the instructor imposes. For more information about student academic integrity: <https://www.nvcc.edu/curcatalog/policies/integrity.html>
- b. **Attendance Policy**
 - i. Regular attendance is essential for success in Web Page Design I. Absences in which work is not made up either in the week in which they occur or the following week will be reflected in the weekly cumulative grade.
- c. **Disabilities**
 - i. Students with disabilities are required to contact NOVA's Office of Disability Support Services (DSS) to discuss possible accommodations. All information is kept confidential and may increase your chances of success in the academic setting. If accommodations are agreed upon, student will receive a Memorandum of Accommodation (MOA) by DSS. For more information about NOVA's DSS office: <https://www.nvcc.edu/disability-services>.
- d. **Self-Advocacy**
 - i. Students are expected to reach out to their instructor if they do not understand content or expectations.

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- ii. College instructors and other college personnel will not talk with a parent without the permission of and presence of the student. The conversation is between the administrator / faculty member and the student. The parent’s role is to listen, give moral support, and summarize information and agreements if needed.
- iii. Dual enrolled students have access to full NOVA campus services including tutoring, library, and counseling services; student resources are found here:
<http://www.nvcc.edu/students/index.html>

III. Course Schedule

a. Critical Course Dates

Course Start Date	Monday, September 16, 2019
Course Drop Date	Friday, October 4, 2019
Course Withdrawal Date	Friday, December 6, 2019
Final Exam Date	Week of January 27 to 30, 2020
Course End Date	Thursday, January 30, 2020

- b. Final Exam Date:** *The final exam will be given during the last week of class, between Monday, January 27 and Friday, January 30.*