

ITT Technical Institute  
**ET455**  
**Digital Communication Systems I**  
**Onsite Course**

**SYLLABUS**

---

**Credit hours:** 4

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

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

Prerequisite: ET315 Electronic Communications Systems II or equivalent; Corequisite:  
ET446 Advanced Circuit Analysis II

**Course Description:**

A study of how digital signals are processed by communications receivers and transmitters, with an emphasis on applying the nature of digital signals to signal formatting, modulation and coding.



## STUDENT SYLLABUS

Instructor: \_\_\_\_\_

Office hours: \_\_\_\_\_

Class hours: \_\_\_\_\_

---

### Major Instructional Areas

- Optical Fiber Transmission Media
- Digital Modulation
- Digital Transmission
- Digital T-carrier and Multiplexing

---

### Course Objectives

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

1. Identify Fiber Optic historical factors and the technical parameters involved in the functioning of fiber optics as a communications medium.
2. List and elaborate on parameters of various important light sources and detectors that apply to fiber optic communications.
3. Determine the limit for information capacity of a band-limited channel.
4. Identify and describe various digital modulation and demodulation techniques
5. Draw the line signal phasor diagram and constellation diagrams for the most used modulation schemes.
6. Determine the probability of error for important modulation methods on channels with known  $E_b/N_o$ .
7. List various important pulse modulation methods and discuss the features of each
8. Describe methods of digitally sampling analog signals including the development of a PCM signal.
9. Define companding and compression
10. Draw and Explain the North American Digital Hierarchy with emphasis on T1 and T3 carrier system details.
11. Describe, in detail, several methods of channel encoding.

---

### Student Textbook

Tomasi, Wayne. Advanced Electronic Communications Systems, 6<sup>th</sup> ed., Pearson Prentice Hall, 2004.  
Tavaholi, Mohamad . Digital Communication I Laboratory Manual, Custom 1<sup>st</sup> ed., Pearson Custom, 2005.

**Course Outline**

Unit	Topic (Lecture Period)	Chapters	Lab and Other Coverage
1	Optical Fiber Transmission Media	1	Lab manual: Introduction and Chapter 1, Homework Exercises from text chapter 1
2	Optical Fiber Transmission	1	Lab manual: Chapter 2, Homework Exercises from text chapter 1
3	Optical Fiber Transmission	1	Lab manual: Chapter 3, Homework Exercises from text chapter 1
4	<b>Exam 1</b> Digital Modulation	2	Lab manual: Chapter 4, Homework Exercises from text chapter 2
5	Digital Modulation	2	Lab manual: Chapter 5, Homework Exercises from text chapter 2
6	Digital Modulation	2	Lab manual: Chapter 6, Homework Exercises from text chapter 2
7	<b>Exam 2</b> Digital Transmission	6	Lab manual: Chapter 7, Homework Exercises from text chapter 6
8	Digital Transmission	6	Lab manual: Chapter 8, Homework Exercises from text chapter 6
9	<b>Exam 3</b> Digital T-Carrier and Multiplexing.	7	Lab manual: Chapter 9, Homework Exercises from text chapter 7
10	Digital T-Carrier and Multiplexing	7	Lab manual: Chapter 10, Homework Exercises from text chapter 7
11	Review and Final Examination	The final examination will be based on the content covered in chapters 1,2,6 and 7	

## Evaluation Criteria and Grade Weights

- Participation and Quizzes 10%
- Homework 15%
- Unit Exams 30%
- Lab exercises 25%
- Final exam 20%

Final grades will be calculated from the percentages earned in class as follows:

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