



Analog Communication Systems (ELE 280)

Chapter (0) Course Outline

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Chapter Contents

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0.1 Course Description

ELE 280 Analog Communications Systems

Introduction to the concept of modulation, types and characteristics of various modulation techniques, Amplitude modulation, Frequency modulation, Phase modulation, Pulse modulation, pulse code modulation, Delta and Adaptive Delta modulation, Time division multiplexing, Digital modulation techniques.

Course goals: This course covers basics of analog communication systems, data transmissions and receiving.

Course prerequisites: ELE 131 signals and systems.

0.2 Course Objectives

Upon a successful completion of this course, the student will be able to:

- Provide students with the knowledge of Communication Systems.
- Identify the types and characteristics of various modulation techniques.
- Provide students with the knowledge of time division multiplexing, digital modulation techniques.

0.3 Course Administration

- Instructors: **Dr. Moataz Elsherbini**
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Office Hours: Tuesday: 12:30 – 2:00
Office: Elkhalafawy Building Room (2nd Floor)
TAs: Eng. Salah Khalil
 - URL: <https://bu.edu.eg/staff/motazali3-courses/18968>
 - Text: B.P Lathi , “Modern Digital and Analog Communication Systems” 5th edition Oxford University Press, 2018.
- Notes: Lecture slides and Assignments are on the web.

0.4 Course Outline

Week	Items/Topics
1	<p>Chapter 0 Course Description and Outline</p> <p>0.1 Course Description 0.2 Course Objectives 0.3 Course Administration 0.4 Course Outline 0.5 Grade Distribution</p> <p>Chapter 1 Introduction to Communication Systems</p> <p>1.0 Wireless Evolution 1.1 Telecommunication Systems 1.2 Communication System Components 1.3 Signals and Systems 1.4 Analog and Digital Signals</p>
2	<p>Chapter 2 Communication system Model</p> <p>2.1 Communication system Model 2.2 Why go to higher frequencies? 2.3 Baseband communications 2.4 Modulation 2.4.1 Why we need Modulation 2.4.2 Modulation Techniques 2.4.3 Why Different Modulation Methods? 2.4.4 What Do We Care About? 2.5 Amplitude Modulation 2.5.1 Basic Block diagram 2.5.2 How AM generated 2.5.3 AM Example 2.5.4 AM types</p>

0.4 Course Outline

Week	Items/Topics
3	<p>2.5.5 AM Representation 2.5.6 Frequency spectrum of AM 2.5.7 AM transmitter Chapter 3 Traditional AM 3.1 Types of Amplitude Modulation 3.2 DSBFC 3.2.1 Block diagram 3.2.2 Mathematical representation of Modulated Signal 3.2.3 Time and Frequency Spectrum of AM wave 3.2.4 USB , LSB and BW 3.2.5 AM Voltage Distribution 3.2.6 AM Power Distribution 3.2.7 Modulation index 3.2.8 DSCFC summary 3.2.9 Modulators techniques 3.2.10 Demodulator Techniques</p>
4	<p>Chapter 4 DSBSC 4.1 DSBSC 4.1.1 DSBSC Block Diagram 4.1.2 Time domain representation 4.1.3 DSBSC .. Frequency domain representation 4.1.4 DSBSC BW & Demodulation 4.1.5 DSB-SC Modulators 4.2 Multiplier Modulators 4.3 Nonlinear Modulators 4.4 Switching Modulators (Diode-bridge modulator - Ring modulator)</p>

0.4 Course Outline (Continued)

5	<p>4.5 Diode-bridge Modulator for DSBSC 4.6 Ring Modulator for DSBSC 4.6.1 Demodulation of DSBSC 4.6.2 DSBSC Features 4.6.3 Solved Example</p> <p>Chapter 5 QAM and SSB</p> <p>5.1 QAM 5.2 SSBSC 5.2.1 Method of Sharp Filter 5.2.2 Method of Phase Shift angle 5.2.3 Power of SSB</p> <p>5.3 VSB 5.3.1 Specification of Side Filter 5.3.2 Power of VSB</p>
6	<p>Chapter 6 Angle Modulation</p> <p>6.1 Preface 6.2 Comparing PM with FM 6.3 Angle Modulation 6.4 Phase Modulation 6.5 Frequency Modulation 6.6 Power of an Angle-Modulated Wave 6.7 Solved Problems of Angle Modulation</p>

0.4 Course Outline (Continued)

7	Midterm Exam (20)
8	Chapter 6 Angle Modulation (Continue) 6.8 Bandwidth of Angle-Modulated Waves 6.9 Narrow Band Angle Modulation 6.10 Wide Band Frequency Modulation 6.11 Solved Examples
9	Chapter 7 FM Generation & Recovery 7.1 Features of Angle Modulation 7.2 Generation of FM 7.3 Demodulation of FM 7.4 advantages and disadvantages of FM
10	7.5 Analog & Digital FM Cellular Phones 7.6 FM Station 7.7 FM Tx & Rx 7.8 Pre-emphasis and De-emphasis in FM 7.9 Filters Types 7.10 Resonance Circuits
11	Midterm (20)

0.4 Course Outline (Continued)

12	Chapter 8 FM Heterodyne Radio Receiver 8.1 RF WIRELESS TRANSCEIVER 8.2 Transmitter 8.3 Channel 8.4 Receiver 8.5 Heterodyning 8.6 IF and Image 8.7 Heterodyning Architecture 8.8 Tx & Rx System Components 8.9 Amplification and Frequency Control
13	Chapter 8 FM Pulse Modulation 8.1 Pulse Modulation 8.2 Sampling Theorem 8.3 Aliasing 8.4 Analog Pulse Modulation (PAM – PWM – PPM) 8.5 Digital Pulse Modulation PCM 8.6 Digital Modulation (Ask – FSK – PSK – QAM) 8.7 TDM Vs FDM
14	<i>Final Review</i>

0.5 Possible Researches

(reports)

1- Selected Topics in Analog Communications Systems

2- survey (literature review) on old transmission systems

3- survey (literature review) on Modern transmission systems

(Practical)

Design a transmitter system using one of analog modulation techniques with aid of suitable CAD tool and Hardware Implementation, testing and results, preparing a report

0.6 Grade Distribution

Evaluation	Miderm1	Miderm2	Quiz/ Project	Total
Pre & Midterm	20	20	20	40

About the Class

- Classroom Protocols:

- Always be on time
- No side conversation
- No cellphones ringing



Give respect **Get** respect

- You're welcome to ask **questions**
- You can interrupt me at any time
- Our responsibility is to facilitate your learning. You have to make the effort
- If you have a question on the lecture material, then
 - Look up a book.
 - Ask me during my office hours, or email me at anytime

Thank you for your attention
