



**Department of Software & Informatics Engineering**

**College of Engineering**

**Salahaddin University**

**Subject: Data Communication**

**Course Book – Second Year**

**Lecturer's name: Mohammed Nasseh**

**Academic Year: Second Semester- 2023/2024**

## Course Book

<b>1. Course name</b>	<b>Data Communication</b>
<b>2. Lecturer in charge</b>	<b>Mohammed Nasseh</b>
<b>3. Department/ College</b>	<b>Software Engineering/College of Engineering</b>
<b>4. Contact</b>	<b>e-mail: mohammed.mohammed@su.edu.krd</b>
<b>5. Time (Hours / Week)</b>	<b>Theory: 2 Practical: 2</b>
<b>9. Keywords</b>	<b>Source, Destination, Transmitter, Receiver, Signal, Data, and Frequency</b>

Course Overview: general overview of the course

- Introduction to Data Communication: Data Communication definition and its main functions
- Data Communication Model: Structure and Operations
- Introduction to key communication tasks
- Understanding some transmission terminologies
- Frequency, Spectrum, and Bandwidth
- Time Domain Concepts
- Frequency Domain Concepts
- Data Rate vs Bandwidth
- Analog and Digital Data Transmission
- Learning Data Encoding Techniques
- Digital Data to Digital Signal Techniques including:
  - Nonreturn to Zero (NTZ-L + NTZI)
  - Multilevel Binary (Bipolar + Pseudoternary)
  - Biphasic (Manchester + Differential Manchester)
- Analog Data, Digital Signal Techniques including:
  - Pulse Code Modulation (PCM)
  - Pulse Amplitude Modulation (PAM)
  - Delta Modulation (DM)
- Digital Data, Analog Signal Techniques including:
  - Amplitude Shift Keying (ASK)
- Understanding the concept of Flow Control and studying some of its techniques:
  - Stop-and-Wait Flow Control
  - Sliding-Window Flow Control
- Understanding the concept of Error Detection and studying some of its techniques:

- Parity Check
- Cyclic Redundancy Check
- Error Control

**11. Course objective:**

The objective of a "Basic Data Communication" course is to provide students with a foundational understanding of the principles, concepts, and technologies underlying the transmission of data in communication systems. The course aims to equip students with essential knowledge and skills that form the basis for more advanced studies in networking and data communication.

**12. Student's obligation**

Homework is normally given and unexpected quizzes provide an active way to keep the students active and more in touch with the subject. In addition quizzes, students attendance and their activity on the lectures will all collected together to form the 3% assessment of each semester.

In the laboratory there will be weekly programmes to be written by the students and the achievement of these programmes will be graded. We may have assignments and practical exams also.

**13. Forms of teaching**

Lectures:

power point presentations are used in addition to the pen and board which are mostly used to make a frequent step by step communication with the students

Practices:

In the lab the students deal with their computers and any explanation or clarification will be done by the projectors which is a dynamic tool for such needs.

**14. Assessment scheme**

The Grade is generated from the examination result(s) with the following weights (w):

- 50% Quizzes, Homework, Assignments and Activities
- 50% Final exam

Note: There will be random quizzes.

**15. Student learning outcome:**

At the end of this course, students will be able to:

- Understand the concept of data communication.
- Understand data communication terminologies.
- Differentiate between data, signal, and information and the representation of data in various forms.
- Deal with different techniques of encoding and decoding
- Understand the concept of error detection Techniques: Parity, CRC, Checksum

### 16. Course Reading List and References:

#### Key References

- "Data and Computer Communications" – By William Stallings any edition
- "Data Communications and Networking" – By Behrouz A. Forouzan 5th Edition

### 17. The Topics:

#### Lecturer's name

1. Introduction to Data Communication
2. Overviewing a communication model
3. Understanding communication tasks
4. Discussing a simplifies Data Communication
5. Introducing some terminologies in data transmission
6. Time Domain Concepts
7. Frequency Domain Concepts
8. Frequency Spectrum vs Bandwidth
9. Data Rate vs Bandwidth
10. To have a better understanding of Digital and Analog Data Transmission, each of Data, Signal, and Transmission will be discussed
11. Digital Data to Digital Signal Techniques
12. Nonreturn to Zero (NTZ-L + NTZI)
13. Multilevel Binary (Bipolar + Pseudoternary)
14. Biphasic (Manchester + Diffirential Manchester)
15. Analog Data, Digital Signal Techniques
16. Pulse Code Modulation (PCM)
17. Pulse Amplitude Modulation (PAM)
18. Delta Modulation (DM)
19. Digital Data, Analog Signal Techniques
20. Amplitude Shift Keying (ASK)
21. Flow Control
22. Stop-and-Wait Flow Control
23. Sliding-Window Flow Control
24. Error Detection
25. Parity Check
26. Cyclic Redundancy Check

Mohammed Nasseh

<b>19. Extra notes:</b>	
<b>20. Peer review</b>	پیداچونہوہی ھاوہل