Computer Network & Communication

- The OSI model and TCP/IP protocol suite.
- TCP / IP Network layer.
- IPv4 addressing
- Delivery and Forwarding of IP packets.
- IP v4
- Address Resolution Protocol ARP
- Internet Control Message Protocol ICMP

Ref1: **"TCP/IP Protocol Suite"** by Behrouze

Artificial Intelligence Techniques

- Search algorithms & methods
  - Blind Search
  - Heuristic Search
- Knowledge representation
  - Logic representation
  - Production representation
  - Network representation
  - Functional representation
- Expert systems

Ref1: **"Artificial Intelligence, structures and strategies for complex problem solving"**, By: George Luger & William Stubblefield

Operating System

1- Operating system structure
2- Processes
3- Threads
4- Process synchronization
5- Cpu scheduling
6- Deadlocks
7- Memory management and virtual memory

Ref1: "Operating System Concepts"
   By Abraham silberschatz, Peter bear galvin, Greg gagne. 9th ed., 2013

Microprocessor

1- Software architecture of 8088 and 8086
2- Assembly language programming
3- Control flow instructions
4- The 8088 and 8086 microprocessor and their memory and input/output interfaces
5- Interrupt interfaces

Ref1: "The 8088 and 8086 Microprocessors, programming, interfacing, software, hardware, & application", By Trieble & singh, 4th ed., 2003

Computer Architecture

1- Top level view of computer function and interaction
2- Cache memory
3- Internal memory and external technology
4- Input/output
5- Addressing modes
6- Processor structure and function
7- Control unit
8- Microprogrammed control

Ref1: "Computer organization and architecture designing for performance"
   By William Stallings, 8th ed., 2010

Information Security

- Classical Encryption Techniques
- Modern Encryption Techniques
    - Symmetric
    - Asymmetric
- Modular Arithmetic
- Introduction to Number Theory
- Diffie-Hellman Key Exchange
- Principles of Hash Function and Digital Signature
- Principles of Information Hiding

Ref1: **"Cryptography and Network Security: Principles and Practice"** (2nd Ed.), William Stallings, Prentice-Hall, Inc., 1999.

Information Technology / Image Processing Techniques

- Introduction
- Image fundamentals
- Image transformation
- Image enhancement
- Image compression

Ref1: **"Digital Image Processing"** by Rafael Gonzale

Information Technology / Data Base

- Normalization
- Data Manipulation Language and Data Definition   } SQL

- Distributed Database Management System Design
- Relational Algebra for Query Optimization
- Transaction Processing Systems
- Controlling Concurrency
- Failure and Recovery

Ref1: **"Principles of Distributed Database System"**
By M. Tame OZSU, 3rd ed., 2011

Information Technology / Object Oriented Programming

- Issues with Procedure Oriented Programming
- Basic of Object Oriented Programming (OOP)
- Procedure Oriented versus Object Oriented Programming
- Concept of Object Oriented Programming
- Object
- Class
- Abstraction
- Encapsulation
- Inheritance
- Polymorphism

Ref1: **"Thinking in C# "**
Ref2: **"C# : How to Program"**