

Module Overview: CS-150

The Big Picture:

- Abstraction
- History of Hardware
- History of Software
- Computer Science as a Discipline

Number Systems:

- Types of Numbers
- Number Representation
- Positional Notation
- Converting Base of Whole Numbers
- Binary Arithmetic

Data Representation:

- Analogue and Digital Information
- Representation of Binary Numbers
- Representation of Negative Values
 - Sign-Magnitude
 - Two's Complement
- Arithmetic with Signed Number Representations
- Integer Overflow
- Representation of Real Values
- Converting Base of Real Numbers
- Scientific Notation Representation
- Representing Text
- Representing Colour
- Representing Images
- Representing Audio

Data Compression:

- The Compression Ratio
- Types of Compression
- Keyword Encoding
- Runlength Encoding
- Huffman Encoding
- Vector vs Raster Graphics
- Spatio-Temporal Compression of Video

Low-Level Programming Languages:

- Machine Language
- Instruction Formatting
- Addressing Modes

Assembly Programming:

- Little Man Computer and Pep/8 Instructions
- The Assembly Process
- The Fetch-Decode-Execute Cycle

Gates and Circuits:

- Boolean Gates
- Boolean Expressions
- Truth Tables
- Construction of Physical Gates (Transistors)
- Building Boolean Circuits from Combinations of Gates
- Boolean Algebra and Laws

Logic Circuits:

- Half Adders
- Full Adders
- Multiplexers
- S-R Latch
- Integrated Circuits

Computing Components:

- Scales and Sizes
- Stored-Program Architecture
- Memory Addresses
- Components of the Von-Neumann Machine
- The Fetch-Decode-Execute Cycle
- Secondary Storage Devices
- Input Devices
- Parallel Computing Approaches

Pseudocode (Not on the Exam):

- Breaking Down Problems
- Development of Algorithms
- Pseudocode "Syntax"
- Use of Flow Charts