Lecture 1: Introduction
“Computer Science”?

• CS is a discipline that involves understanding and designing of computers and computational processes that deal with software systems to solve problems.

• With a central focus of handling / manipulating information, many problems in healthcare, business, and other areas can be solved effectively with computers and existence of domain knowledge.
“Computer”?

- Simply a set of small electronic switches that are either on or off! With different combinations of these switches, you can make the computer do something (e.g. display something).

- Computers use a simple language (Known as Machine Language) that consists of only 1s and 0s, where 1 means "on" and 0 means "off."
Trying to talk to a computer in Machine Language is hard!, thus a programming language acts as a *translator* between you and the computer that simply telling a computer what to do.

Specialized program known as a *compiler* takes the instructions written in the programming language and converts them to machine language.
“Programming Language”?

• PL is a special language used by programmers to develop programs (sets of instructions) that involve a computer to perform some kind of computation.

• A program does nothing more than tell the computer to accept input, manipulate it, and output results in some form.

• As any language, PL is split into two components:
  ✷ Syntax: defines the form and rules to write program.
  ✷ Semantics: defines the meaning and logic behind.
### Examples on programs!

<table>
<thead>
<tr>
<th>Program</th>
<th>Inputs</th>
<th>What the Program Does</th>
<th>Outputs</th>
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<tbody>
<tr>
<td><strong>Word Editor</strong></td>
<td>Characters you type from keyboard</td>
<td>Formats the text and corrects spelling</td>
<td>Displays / prints neatly organized text</td>
</tr>
<tr>
<td><strong>Game</strong></td>
<td>Keystrokes or joystick movements</td>
<td>Calculates how fast and far to move the figure on-screen</td>
<td>Moves a cartoon figure on-screen</td>
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<tr>
<td><strong>Stock Market Predictor</strong></td>
<td>Current and past prices for stocks</td>
<td>Tries to recognize trends in a stock's price fluctuations</td>
<td>Predicts the future price of a stock</td>
</tr>
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</table>
Application programs

Word, games, database

Systems Software

Operating systems, device drivers, compilers

Machine with all hardware components
Logical Units of a Computer System:

- **Input unit** (e.g. Mouse, keyboard)
- **Output unit** (e.g. Printer, monitor, audio speakers)
- **Arithmetic and logic unit (ALU):** Performs calculations
- **Memory unit:** Stores the *running program*, retains input and processed information
- **Central processing unit (CPU):** *execute instructions* and Supervises operation of other devices
- **Secondary storage unit (e.g. Hard-drives):** store data and programs that are *not running at that time*. 