MAM 109 COMPUTER APPLICATIONS

LECTURE NO.1 (Spring 2026) [Mechatronics Engineering and Automation Program]

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LECTURE RULES

"Great things come from hard work and perseverance. No excuses."

KOBE BRYANT

COURSE SPECIFICATIONS

- Course code-title: **MAM 109 - Computer Applications**
- **1st level** in Mechatronics Engineering and Automation Program
- Course duration: **One semester**
- Course type: **Compulsory**
- **2** credit hours, **3** contact hours [1 Lecture + 2 Laboratory]
- Total grades: **100** [10 Student activity, 30 Midterm 1, 20 Midterm 2, 40 Practical exam]
- Minimum rating for success: **D Rating** [GPA 1.00, 64% > Grades > 60%]
- Course pre-requisite: **FRE 012 - Computer Programming**
- Lecture scheduled on **Monday** in **Q8 Hall**, third floor

COURSE SPECIFICATIONS

- **Course Contents:**

- Developing basic concepts of algorithmic thinking to solve problems of relevance in engineering practice and implementing these algorithms MATLAB.
- Loops, control structures, functions, arrays. Create MATLAB programs that solve real-world problems in engineering and the sciences.
- Numerical methods, solution of nonlinear equations, plotting, logic operations, and graphical user interfaces to design, test, and debug numerical algorithms.

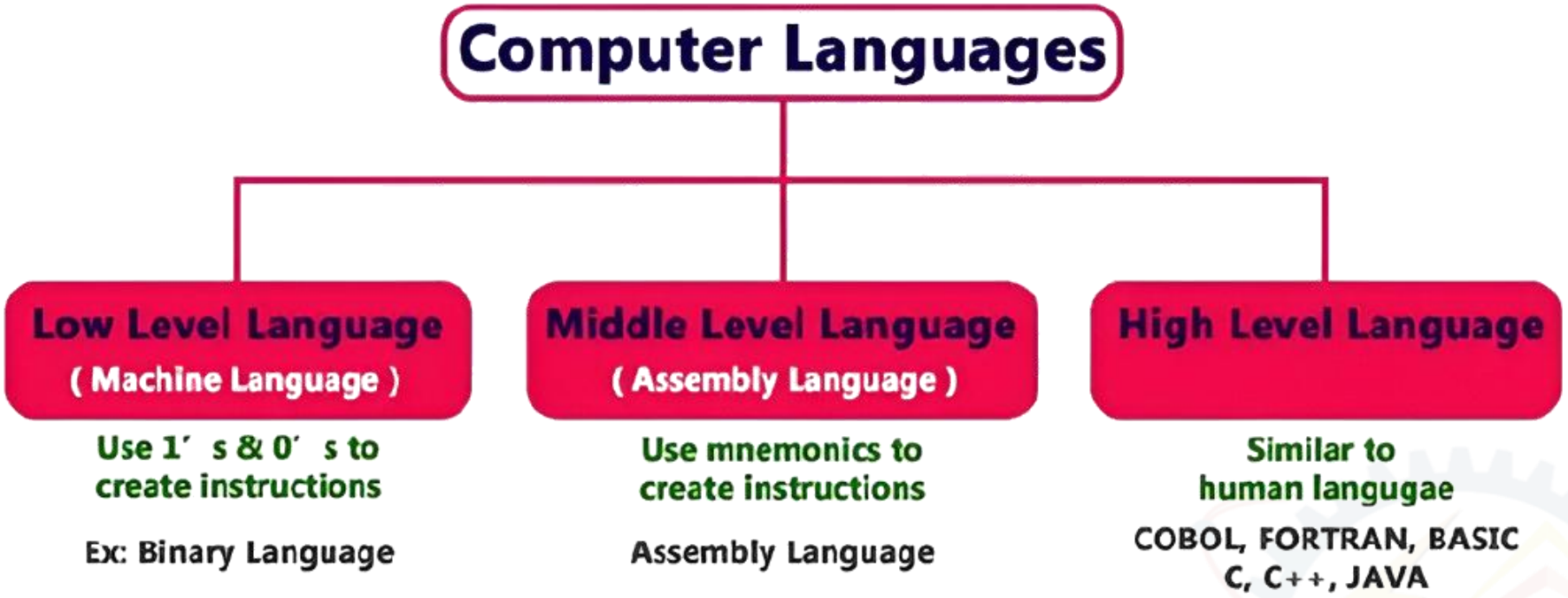
COURSE SPECIFICATIONS

- **Course Map:**

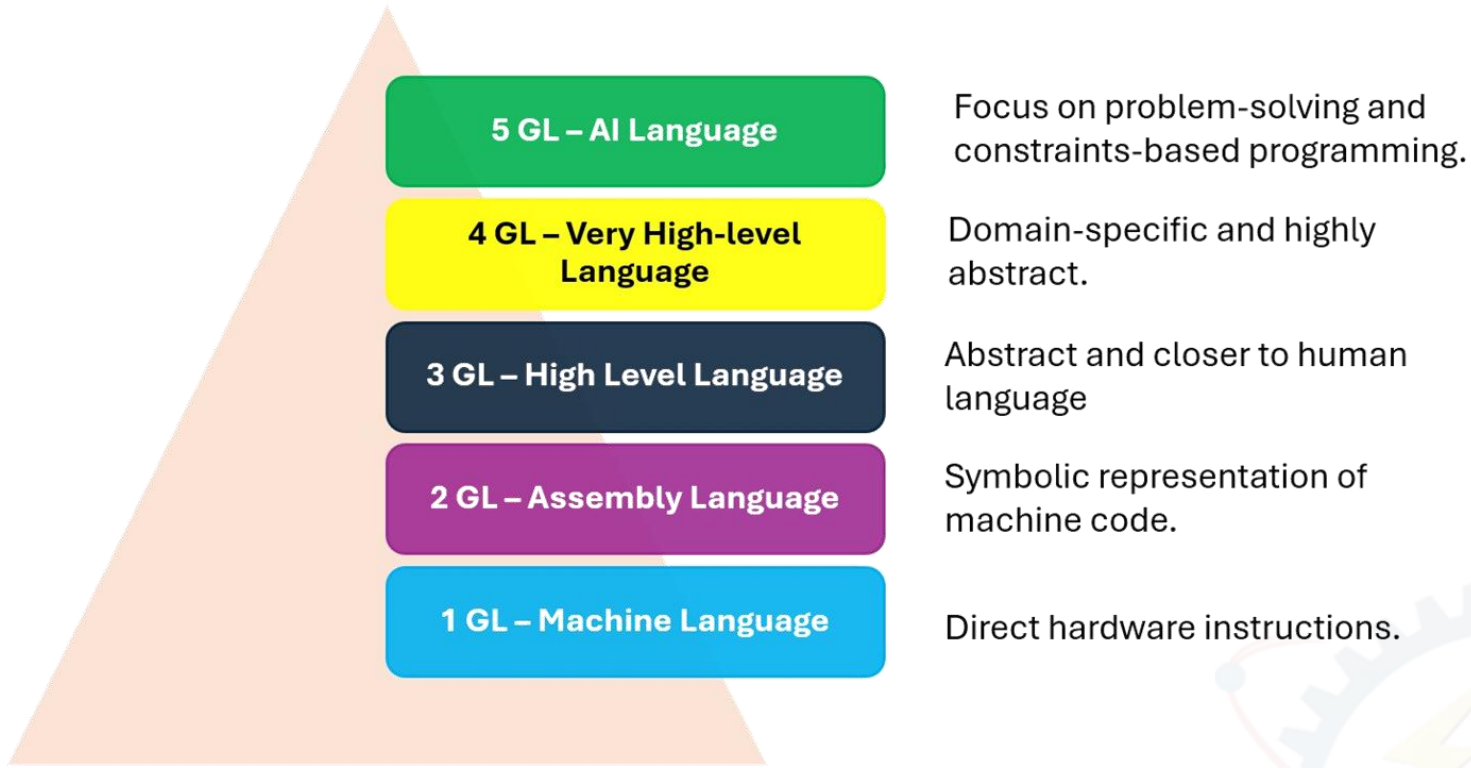
INTRODUCTION

- To leverage the computational power of modern computers in engineering applications, engineers must provide the computer with a set of instructions—**a program or script.**
- To address engineering problems, we translate tasks such as solving differential equations, evaluating integrals, finding roots of equations, into a series of arithmetic procedures.
- These are expressed as sets of algebraic steps that the computer can follow.
- The structured, step-by-step method defining how a problem is solved, called an **algorithm.**
- Engineers may either develop their own algorithms tailored to specific problems or make use of the predefined algorithms provided by programming environments.

INTRODUCTION



INTRODUCTION

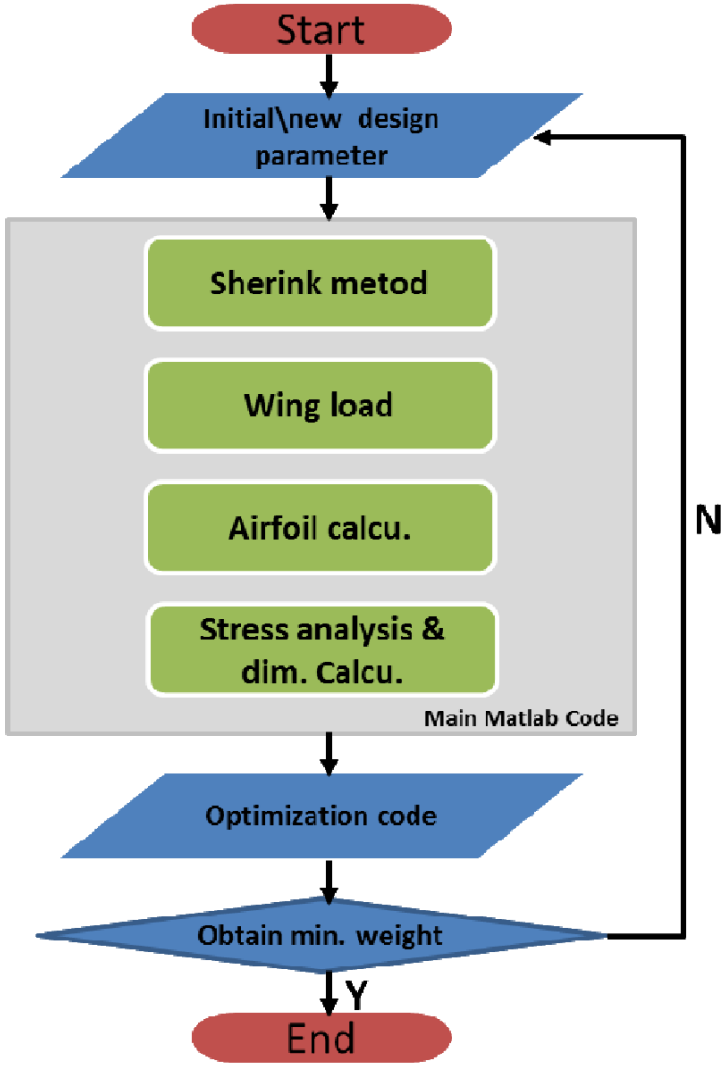


Generations of Computer Language

INTRODUCTION

- **The tasks carried out for computer programming:**
- Studying the problem to be programmed including the geometry of the problem.
- Listing the algebraic equations to be used, based on the known physical phenomena.
- Selecting the most efficient numerical method for obtaining a solution.
- Creating an outline or a flow chart for the program flow.
- Writing the program using the list of algebraic equations and the outline or flow chart.
- Debugging the program by running it and fixing any syntax errors.
- Testing the program by running it using parameters with a known solution.
- Refining and further debugging the algorithm and program flow.

INTRODUCTION



INTRODUCTION

$$x^2 - 3x = 4$$

Equation roots ?

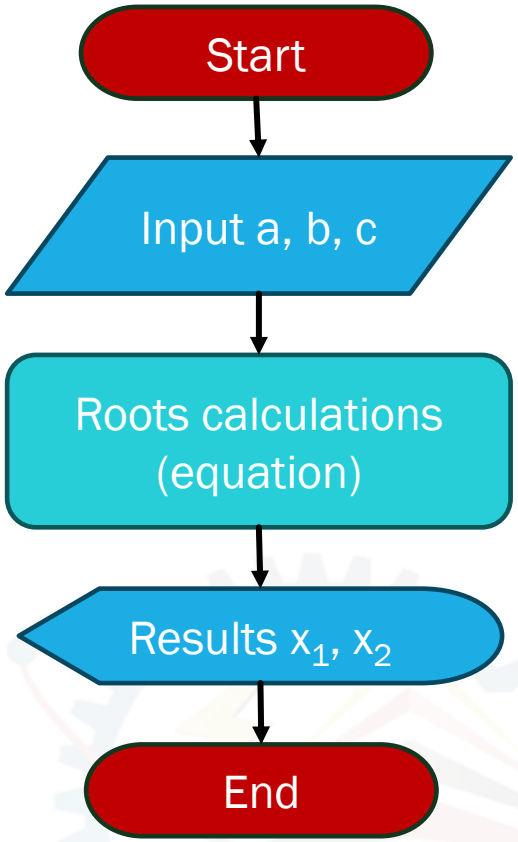
INTRODUCTION

$$x^2 - 3x = 4$$

$$x^2 - 3x - 4 = 0$$

$$a = 1, b = -3, c = -4$$

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$



INTRODUCTION

- **The main components for computer language:**
- Syntax: The rules that define how programs must be written.
- Keywords: Special words that have predefined meaning in the language.
- Variables and Data Types.
- Operators: Symbols that perform operations on data.
- Control Structures: Direct the flow of execution in a program.
- Functions/Procedures: Blocks of code designed to perform a specific task.
- Input and Output (I/O): Mechanisms for communication between the program and user.
- Libraries/Modules: Pre-written collections of functions and tools that extend the language.

WHY MATLAB?

- MATLAB is a software program for numeric computation, data analysis, and graphics.
- **Has many advantages compared to conventional computer languages:**
- Ease of Use.
- Platform Independence: supported on many different computer systems.
- Predefined Functions: extensive library of predefined functions.
- Device-Independent Plotting: has many integral plotting and imaging commands.
- Graphical User Interface.
- MATLAB Compiler: Create a stand-alone codes running on computers without MATLAB.
- Toolboxes: designed to solve problems in specialized areas.

END OF PRESENTATION