

GLP-F020

اسم القسم: هندسة تقنيات الأجهزة الطبية / اسم المختبر: نظم الاتصالات الطبية / المرحلة: الثالثة / رمز المختبر: BL

407

سجل التجارب للعام الدراسي 2023-2024

رقم التجربة: - Experiment No.1

اسم التجربة: - Introduction to MATLAB

الغرض من التجربة: - To know how to use the Simulink environment in
MATLAB

الاجهزة والمعدات: - Computer

مقدمة: -

What is MATLAB?

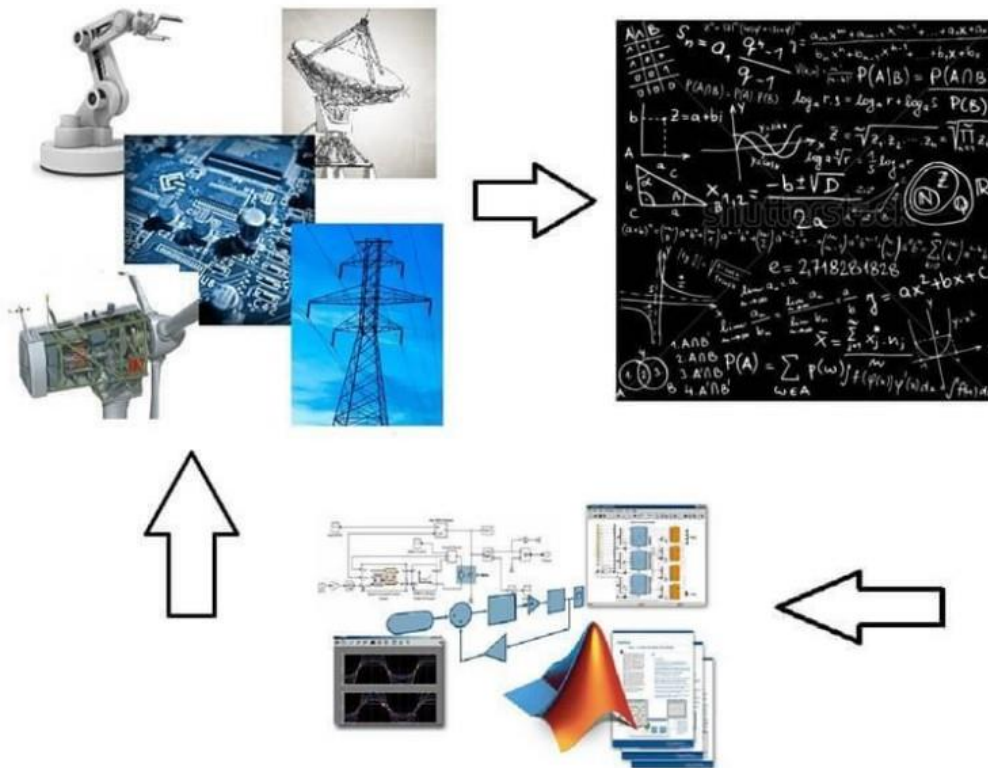
MATLAB® is a programming platform designed specifically for engineers and scientists to analyze and design systems and products that transform our world. The heart of MATLAB is the MATLAB language, a matrix-based language that allows the most natural expression of computational mathematics.



What Can I Do with MATLAB?

1. Analyze data
2. Develop algorithms
3. Create models and applications

MATLAB lets you take your ideas from research to production by deploying to enterprise applications and embedded devices, as well as integrating with Simulink® and Model-Based Design.



What is Simulink?

Simulink is a simulation and model-based design environment for dynamic and embedded systems, which are integrated with MATLAB. Simulink was developed by a computer software company MathWorks.

It is a data flow graphical programming language tool for modeling, simulating, and analyzing multi-domain dynamic systems. It is basically a graphical block diagramming tool with a customizable set of block libraries.

Furthermore, it allows you to incorporate MATLAB algorithms into models as well as export the simulation results into MATLAB for further analysis.

Simulink supports the following:

- System-level design.
- Simulation.
- Automatic code generation.
- Testing and verification of embedded systems.

Why MATLAB and Simulink for Communications?

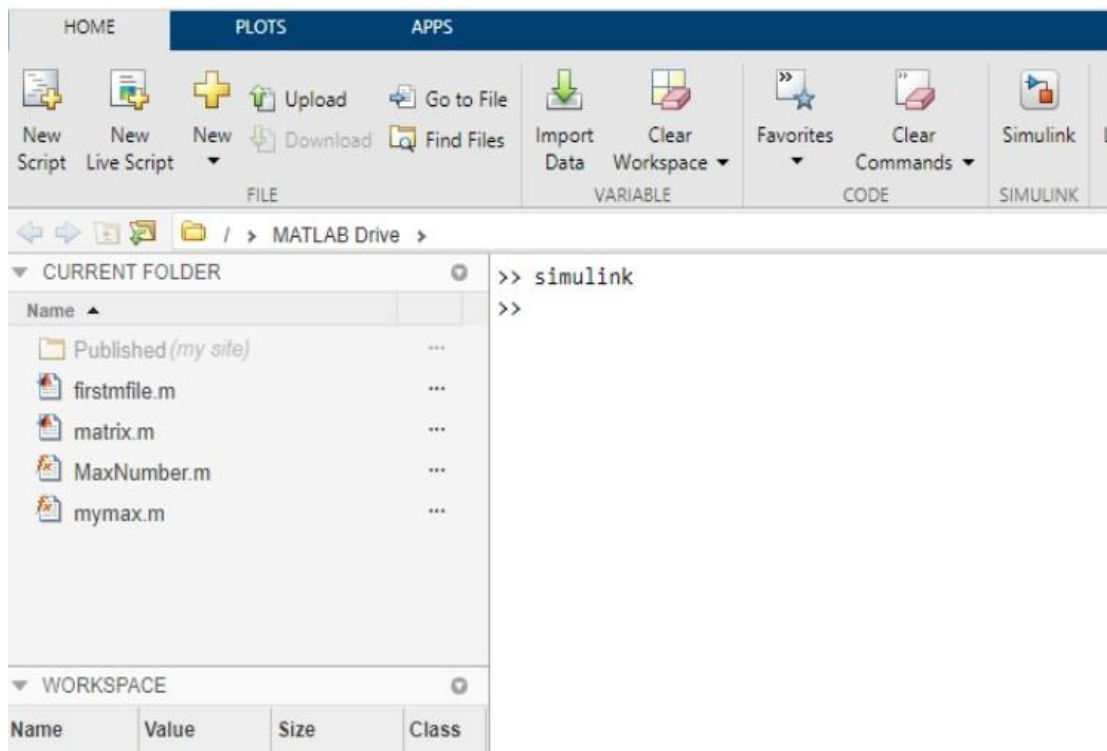
Leading engineering teams use MATLAB and Simulink to develop new 5G radio access technologies. You can simulate, analyze, and test 5G, Wi-Fi, LTE, Bluetooth, satellite navigation, and communication systems and networks. Also, you can:

- Jointly optimize your digital, RF, and antenna components and models, improving your end-to-end system performance
- Optimize system components using machine learning, deep learning, or reinforcement learning techniques

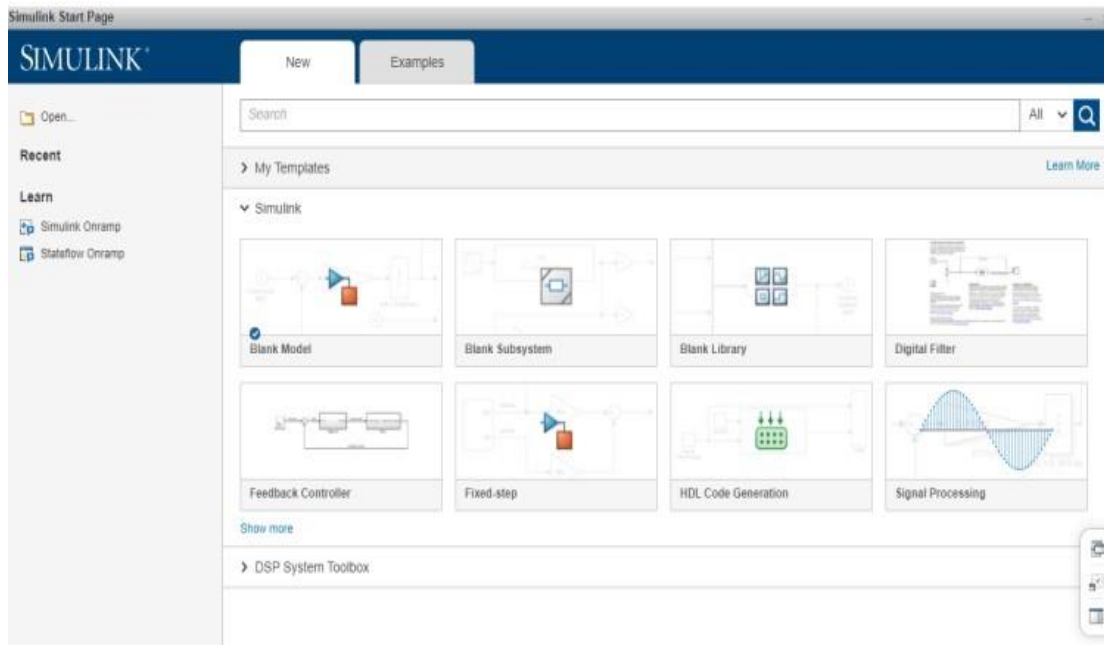
- Design massive MIMO, millimeter-wave, and beamforming systems using antenna and antenna arrays
- Assess real-world wireless network performance and metrics on maps using indoor and outdoor propagation scenarios and channel models
- Automatically generate HDL or C code for prototyping and verify systems under test with over-the-air testing

How to get started with Simulink?

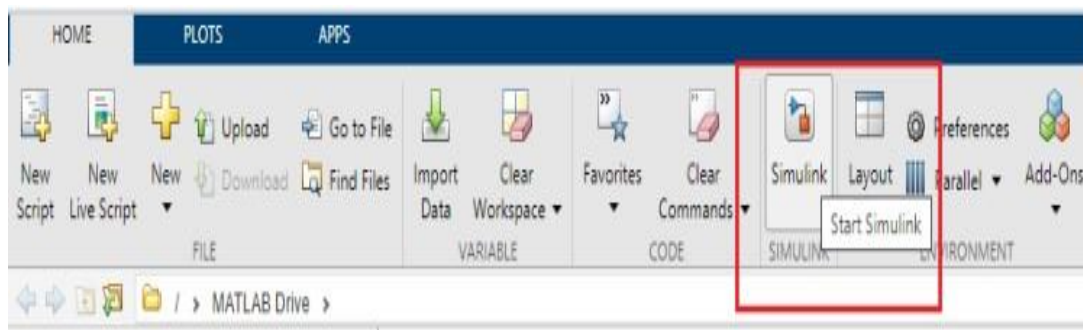
type Simulink in the command window as shown below:



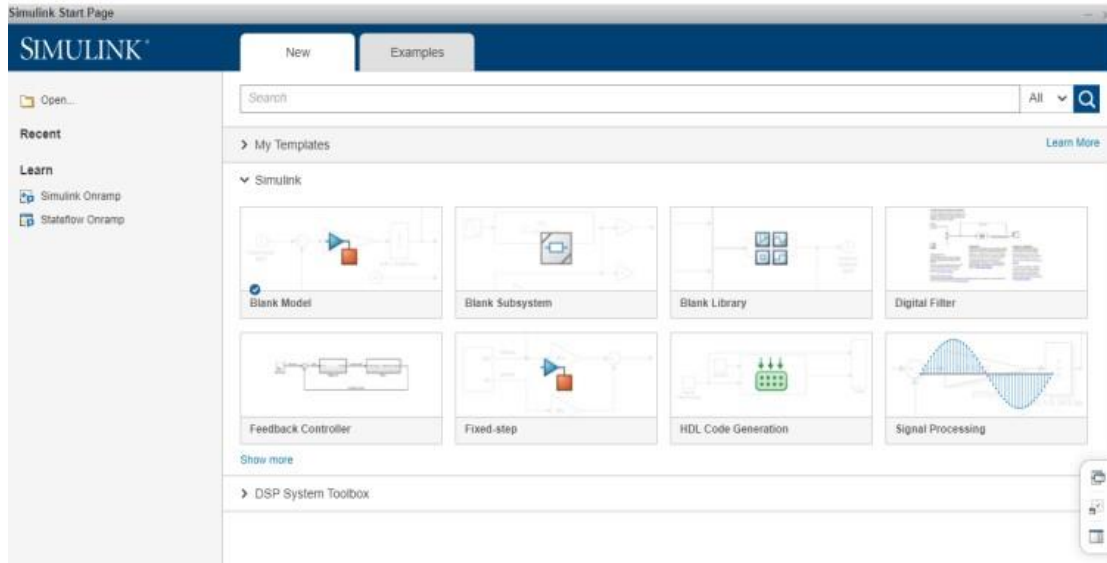
It will open the Simulink page as shown below:



You can also make use of Simulink icon present in MATLAB to get started with Simulink:

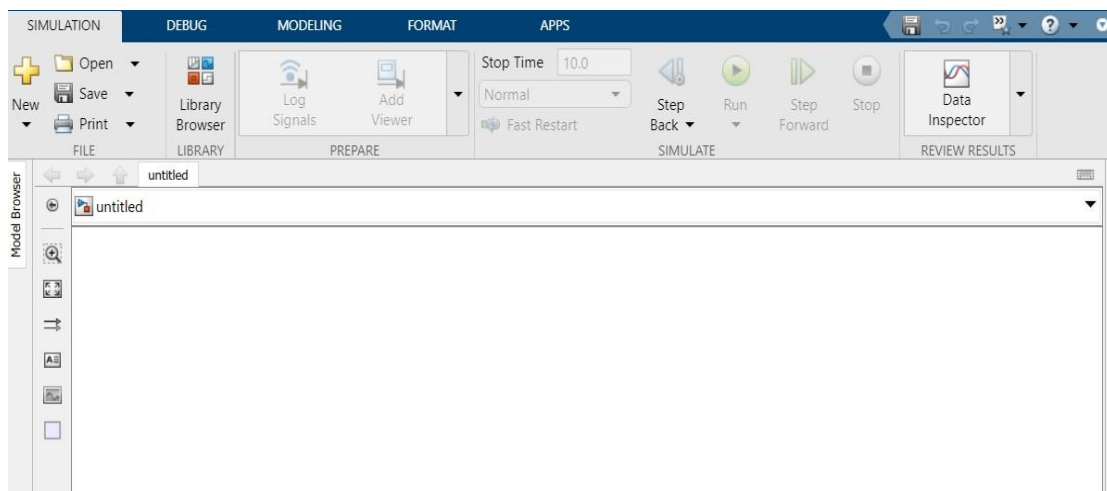


When you start Simulink, you are navigated to the start page as shown below:

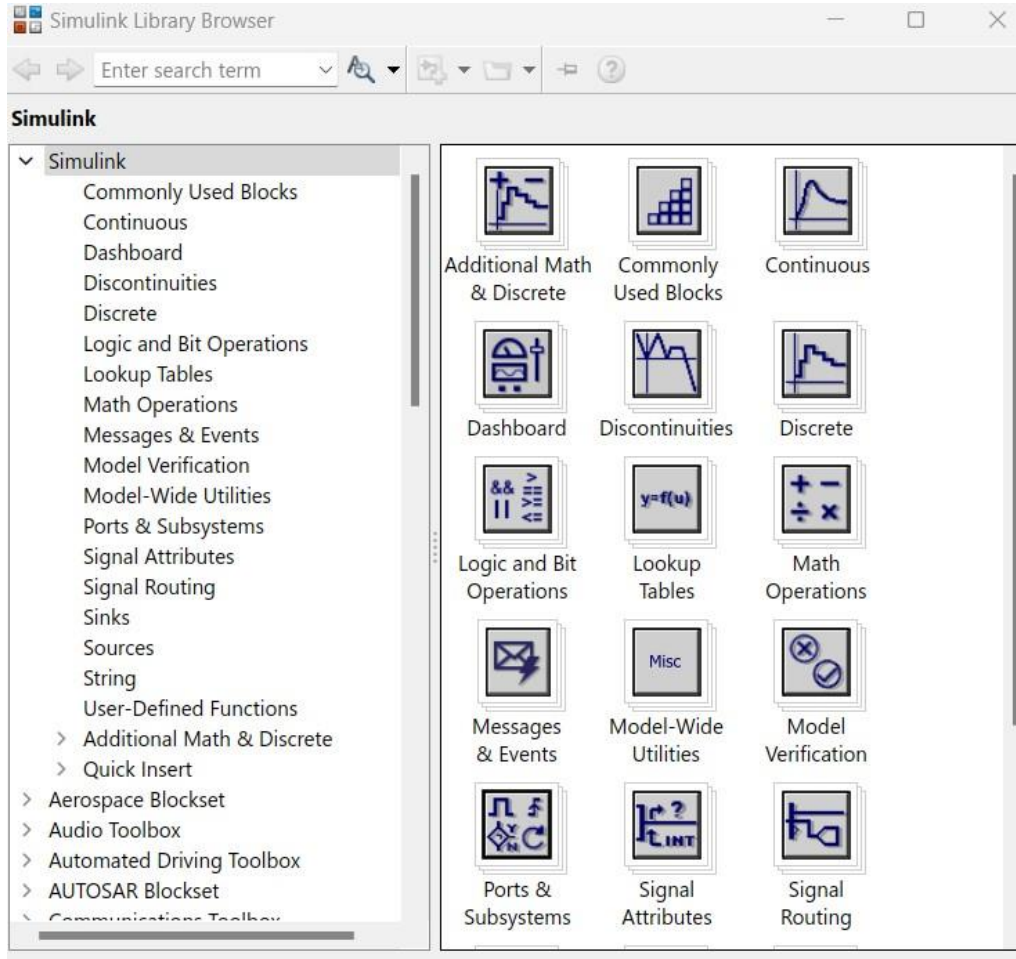


Here you can create your own model and also make use of the existing templates. Click on the **Blank Model** and you will get a Simulink library browser that can be used to create your own model.

The screen for the Blank model is as follows:



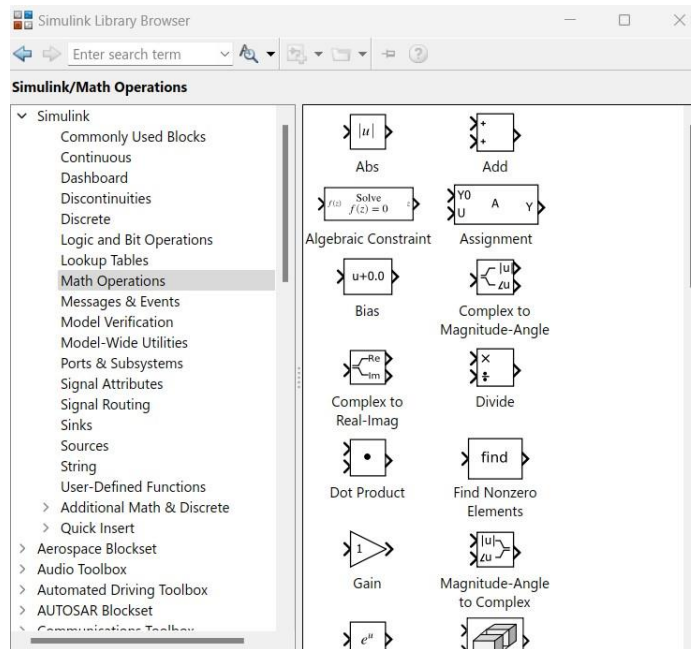
Click on Library and it will display you the **Simulink library** as shown below:



The Simulink library browser is a collection of many libraries. It offers Commonly Used Blocks, Continuous, Dashboard, Logic and Bit Operation, Math Operations, etc.

Besides that, you will get another library list like the Control system toolbox, DSP system toolbox, etc.

Here is an example of a Math operations library list:



It has Abs, Add, Algebraic Constraint, Assignment, etc. that you can make use of in your model.

Given below is an example of Logic and Bit Operations:

