

## Lab Assignment 1

### Familiarization of Signal Generation

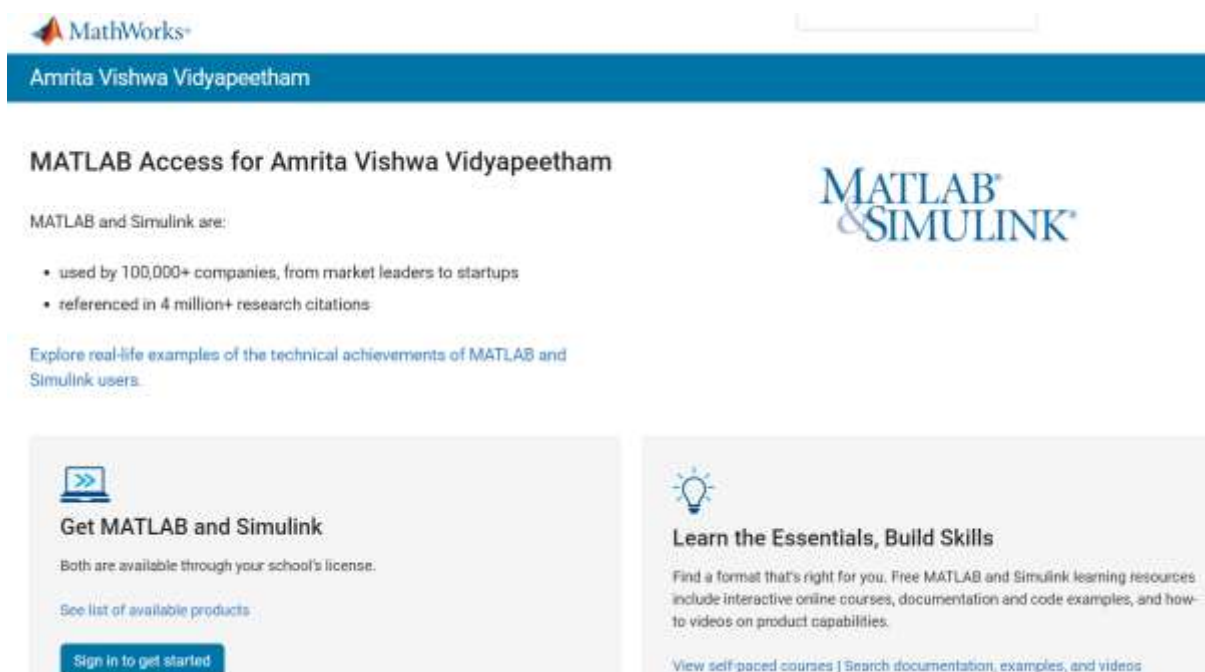
#### MATLAB INSTALLATION

MATLAB is a software package for high-performance language for technical computing developed by [MathWorks](https://www.mathworks.com/). It integrates computation, visualization, and programming in an easy-to-use environment where problems and solutions are expressed in familiar mathematical notation. The name MATLAB stands for matrix laboratory. MATLAB features a family of add-on application-specific solutions called toolboxes. Toolboxes are comprehensive collections of MATLAB functions (M-files) that extend the MATLAB environment to solve particular classes of problems. Areas in which toolboxes are available include Image processing, signal processing, control systems, neural networks, fuzzy logic, wavelets, simulation, and many others.

#### Installation

**System Requirements:** <https://in.mathworks.com/support/requirements/matlab-system-requirements.html>

To associate to the Campus-Wide License, open the portal [MathWorks](https://in.mathworks.com/).



The screenshot shows the MathWorks website interface. At the top, the MathWorks logo is visible. Below it, a blue banner displays the user's name, "Amrita Vishwa Vidyapeetham". The main heading is "MATLAB Access for Amrita Vishwa Vidyapeetham". Underneath, it states "MATLAB and Simulink are:" followed by two bullet points: "used by 100,000+ companies, from market leaders to startups" and "referenced in 4 million+ research citations". There is a link to "Explore real-life examples of the technical achievements of MATLAB and Simulink users." Below this, there are two main sections. The left section, titled "Get MATLAB and Simulink", includes the text "Both are available through your school's license." and a link to "See list of available products." with a "Sign in to get started" button. The right section, titled "Learn the Essentials, Build Skills", includes the text "Find a format that's right for you. Free MATLAB and Simulink learning resources include interactive online courses, documentation and code examples, and how-to videos on product capabilities." and a link to "View self-paced courses | Search documentation, examples, and videos".

- Click on Sign in to get started
- Sign in using your MathWorks Account with your college email address. ([click to know more](#))

Steps to Install MATLAB: ([Instructional video](#))

- Click the download button for the current release.(Users can also download previous releases here).
- Choose a supported platform (Windows / Mac / Linux)and download the installer.
- Run the installer.
- In the installer, select Login with a MathWorksAccount and follow the online instructions.
- When prompted to do so, select the Academic–Total Headcount license labeled Individual.
- Select the products you want to download and install. You can add products later as well.
- After downloading and installing your products, keep the Activate MATLAB checkbox selected and clickNext.
- Select "Activate automatically using the internet.“
- Log into your MathWorks account
- Select the Academic–TotalHead count license labeled Individual.
- Click “Finish" to complete the activation process.

Several cloud-based tools are available such as:

- MATLAB Online-Use MATLAB in a web browser without installing, configuring, or managing any software. MATLAB Mobile-Evaluate MATLAB commands, create and edit files, visualize data, and view results all from your iPhone, iPad, or Android device.
- MATLAB Drive – MATLAB Drive provides a common cloud-based storage location for your MATLABfile.
- Learn to Use MATLAB and Simulink - **MATLAB Onramp, Simulink Onramp** and DeepLearning Onramp(free2-hour overview of MATLAB)and other course offerings.
- MATLAB Help – Provides link to installation support and documentation.

## ASSIGNMENTS

1. Generate the following continuous time signals
  - a. Sinusoidal signal
  - b. Square signal
  - c. Exponential signal
  - d. sawtooth signal
  - e.  $X_1 = \sin(2\pi t/T) \cdot \exp(-2t)$
  - f.  $X_2 = 2\cos(2\pi t/T_2) \cdot \sin(2\pi t/T_3)$
  - g.  $X_3 = \sin(2\pi t/T) \cdot \exp(-2t) + \sin(2\pi t/T_1) \cdot \exp(-4t)$

### MATLAB functions and methods to be familiarised

1. Use MATLAB Help to familiarise basic functions: plot, stem, subplot, xlabel, ylabel, title, axis, clc, clear all, close all, input

2. Familiarise the usage of MATLAB inbuilt functions sin, square and sawtooth

Code for 1 a,b,c and d

```
clear all;
f = 2; %frequency of modulating signal
T = 1/f; %time period in sec
t = 0:0.01:6;

%Sinusoidal signal
x1 = sin(2*pi*f*t);
subplot(3,2,1);
plot(t,x1);
title('Sinusoidal Signal');
ylabel("x1(t)"), xlabel("t");

%Square signal
x2=square(t);
subplot(3,2,2);
plot(t,x2);
title('Square Signal');

%exponential signal
x3=exp(-2*t);
subplot(3,2,3);
plot(t,x3);
title('Exponential Signal');

%Sawtooth signal
x4=sawtooth(t);
subplot(3,2,4);
plot(t,x4);
```

2. Plot discrete time periodic signals of given amplitude and frequency
  - a. Sine wave
  - b. Square wave
  - c. Triangular wave

Note : Try with different amplitudes and frequencies so that you will be able to understand thoroughly