

<https://www.halvorsen.blog>



# MATLAB for Students

MATLAB Course for new Master Students

Hans-Petter Halvorsen

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# Web Site

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MATLAB for Students

## MATLAB for Students

MATLAB Course  
Hans-Petter Halvorsen

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<https://www.halvorsen.blog/documents/teaching/courses/matlab>

# The purpose with this Course

- To give a **Practical** Introduction to basic Programming and Simulation.
- The students in the Master programs at USN are from all over the world, with varying background and skills.
- It is important that everyone has the same basic skills when they start working with the different courses in your Master study. Some of the students are inexperienced in programming and many have only been learning it from the blackboard only - with no practical implementations and experimentation.
- Programming, Calculations and Simulations using Numerical methods are the essence in all kind of Engineering work and will also be the focus in this course
- To learn to use the MATLAB software within these Applications. When you have learned MATLAB, you may easily switch to similar programs.
- **Programming-based learning:** Use of programming to solve practical problems will be more and more integrated in every course at the university and in real-life. **Tomorrow's challenges cannot be solved by pen and paper.**

# What will you Learn?

- In this course we will use computer programming as a key method for solving mathematical problems.
- MATLAB Programming
- Using MATLAB in Mathematics, Modelling, Simulation and Control applications.
- Simulink.
- MATLAB is a tool for technical computing, computation and visualization in an integrated environment.
- MATLAB is an abbreviation for MATrix LABoratory, so it is well suited for matrix manipulation and problem solving related to Linear Algebra, Modelling, Simulation and Control applications, etc.
- Solving Numerical Problems, such as solving Differential Equations, Curve Fitting, Optimization problems, etc.

The image displays the MATLAB R2021a interface. The top ribbon includes tabs for HOME, PLOTS, APPS, EDITOR, PUBLISH, and VIEW. The EDITOR tab is active, showing a code editor with a function definition for 'add.m'. The Command Window shows the execution of the function with variables x=2, y=5, and z=7. The Current Folder pane shows the file 'add.m' in the 'C:\Temp' directory. The Workspace pane shows the variables x, y, and z with their respective values.

**Current Folder**

**Editor**

```
1 function sum = add(a, b)
2 sum = a + b;
```

**Command Window**

```
>> x=2;
>> y=5;
>> z = add(x,y)

z =

    7

fx >>
```

**Workspace**

Name	Value
x	2
y	5
z	7

**Current Folder**

C:\Temp

add.m

Select a file to view details

UTF-8 add Ln 2 Col 13

# Teaching and Learning Methods

- **No regular Lectures!**
- **Learning by Doing**
- This course is all about doing **Exercises** under supervision and guidance
- Open the **Self-paced Course Manual** and start doing the Exercises inside
- Introduction **Videos** and Videos for most of the Exercises when you are stuck
- Online guidance using **Microsoft Teams**

# Teaching and Learning Methods

- **You don't learn MATLAB/Programming by watching lectures.**
- **The only way to learn MATLAB/Programming is to do a lot of coding by yourself.**
- It takes time and may be demanding, but that's the only way!
- The reward is knowledge that goes deep, and you will gain skills that are highly desired by the industry and work life.
- Feel free to **Explore!**
- Try to **Add Extra Value** and be creative compared to the simplified examples given by the supervisors, in that way you learn so much more.



# Course Schedule

- Part 1: Introduction to MATLAB
- Part 2: Modelling, Simulation and Control
- Part 3: Simulink
- Final Test and Diploma

Note! Each part has a separate Web Page and a separate Course Manual (PDF)

# Course Manuals

Download the Course  
Manuals as PDF documents

## Part 1

### Introduction to MATLAB

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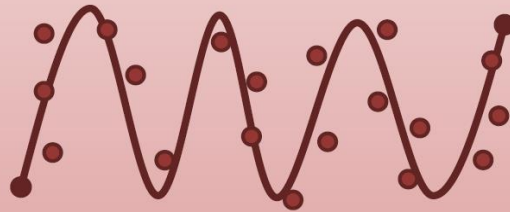


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## Part 2

### Modelling, Simulation and Control in MATLAB

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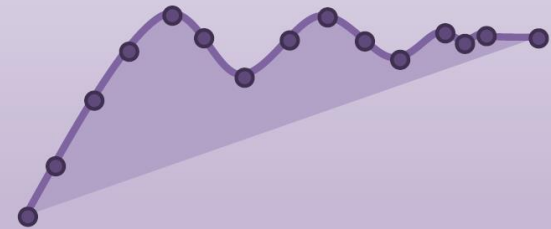


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## Part 3

### Simulink and Advanced Topics in MATLAB

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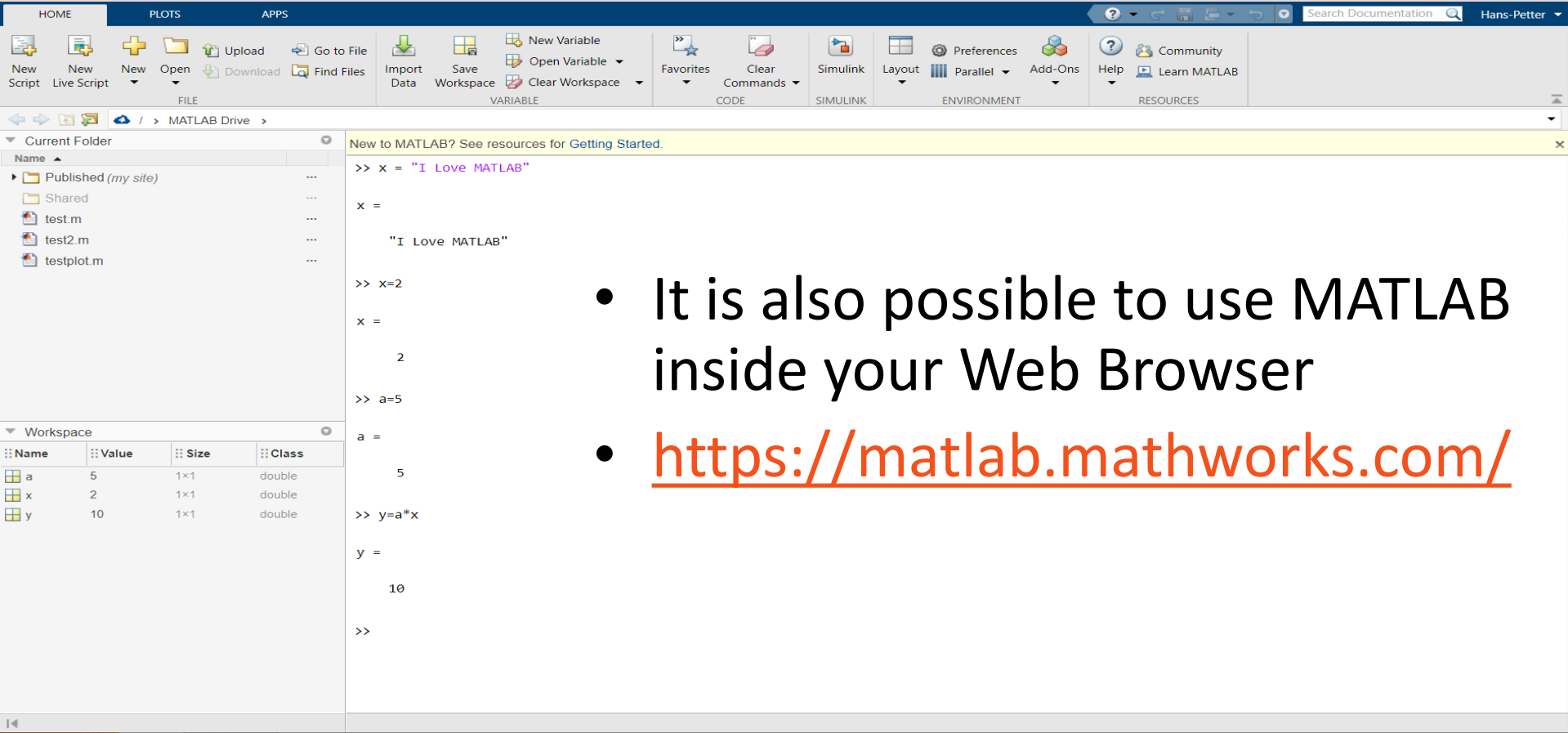


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# Installing MATLAB Software

- You need to install MATLAB on your personal computer.
- Students and staff at University of South-Eastern Norway can freely install the MATLAB software on their own computers, since the university has a Total Academic Headcount (TAH) License
- Download MATLAB here:  
<https://mathworks.com/download>
- License information is provided in Canvas, Intranet (my.usn.no/min.usn.no) and in Microsoft Teams

# MATLAB Online



The screenshot displays the MATLAB Online web interface. The top navigation bar includes tabs for HOME, PLOTS, and APPS. Below this is a toolbar with various icons for file operations (New Script, Live Script, New, Open, Upload, Download, Find Files, Import Data, Save Workspace, Clear Workspace), variable management (New Variable, Open Variable, Clear Commands), and environment settings (Simulink, Layout, Parallel, Add-Ons, Preferences, Help, Community, Learn MATLAB). The main workspace is divided into three sections: a file browser on the left showing the current folder (MATLAB Drive) with subfolders like Published, Shared, and test.m files; a central command window with a yellow header "New to MATLAB? See resources for Getting Started." containing MATLAB code and its output; and a workspace table at the bottom left.

```
>> x = "I Love MATLAB"
x =
    "I Love MATLAB"
>> x=2
x =
     2
>> a=5
a =
     5
>> y=a*x
y =
    10
>>
```

Name	Value	Size	Class
a	5	1×1	double
x	2	1×1	double
y	10	1×1	double

- It is also possible to use MATLAB inside your Web Browser
- <https://matlab.mathworks.com/>

# Microsoft Teams

- Do you have Questions or need Help when not in Class?
- In this course Microsoft Teams will be used for communication, questions, guidance, assistance, etc.
- Very often someone else is wondering about the same as you - or perhaps someone else has experienced the same thing and found a solution for the problem?
- Need help outside normal office hours? Perhaps a fellow student can help you if you ask your questions here?
- For example, if you have installation problems, etc., a fellow student can usually respond better than the supervisor can (outside scheduled hours, evenings, weekends, etc.). You also learn a lot from helping each other.
- Contact supervisors or other students using the Chat or have Video meetings

# Diploma

## Diploma

Hans-Petter Halvorsen

Score: 55%

Course in basic MATLAB programming. The course included the following topics: vectors, matrices, plotting, scripts, user-defined functions, differential equations, discrete systems, interpolation, curve fitting, numerical differentiation, integration, Simulink, etc.

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- This is a voluntary course, and you get no grades or credits in this course.
- As an extra service with no additional charge, I will provide you a Diploma.
- If you are absent more than 3 times (out of 9), you will not get a diploma!
- This means you can choose to follow the course outside campus, but you will then not get a diploma.
- Being a student is a full-time job, so it is expected that you are at the university campus during ordinary work hours (Monday-Friday ~8-16).
- In addition to the compulsory attendance, you also need to take a Final Test in order to get the Diploma.

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