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MATLAB for Students

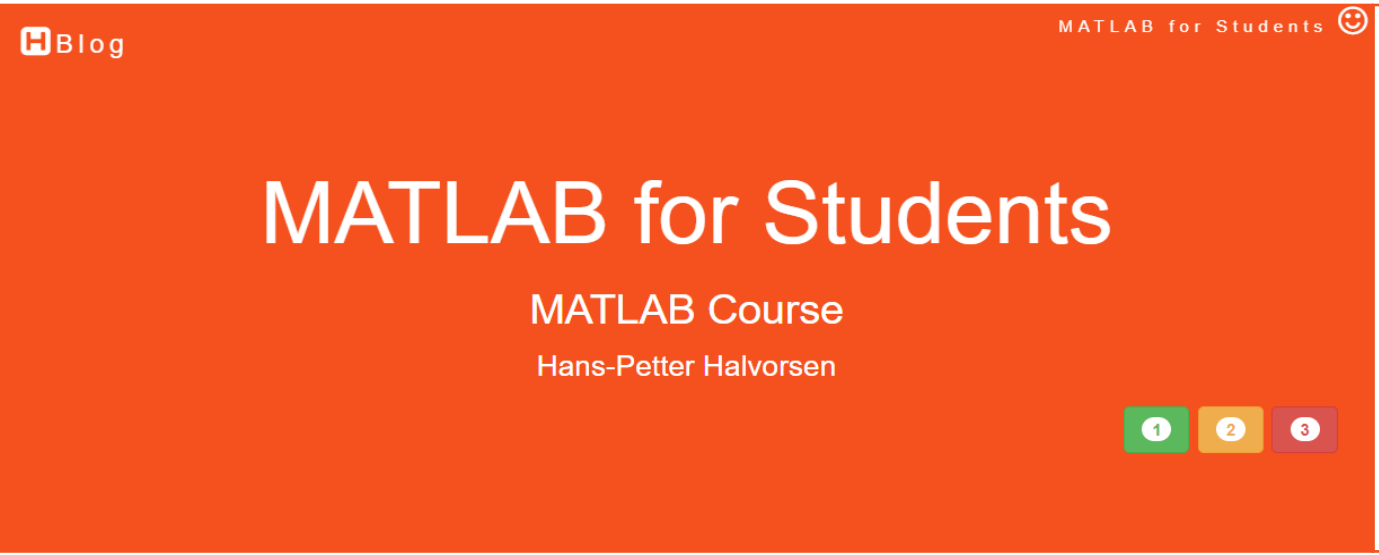
MATLAB Course for new Master Students

Hans-Petter Halvorsen

Contents

- Where is the Course? Where do you find the Course Material?
- The purpose with this Course
- What will you Learn?
- Teaching and Learning Methods
- Course Schedule
- Installing MATLAB
- Microsoft Teams
- Diploma

Web Site



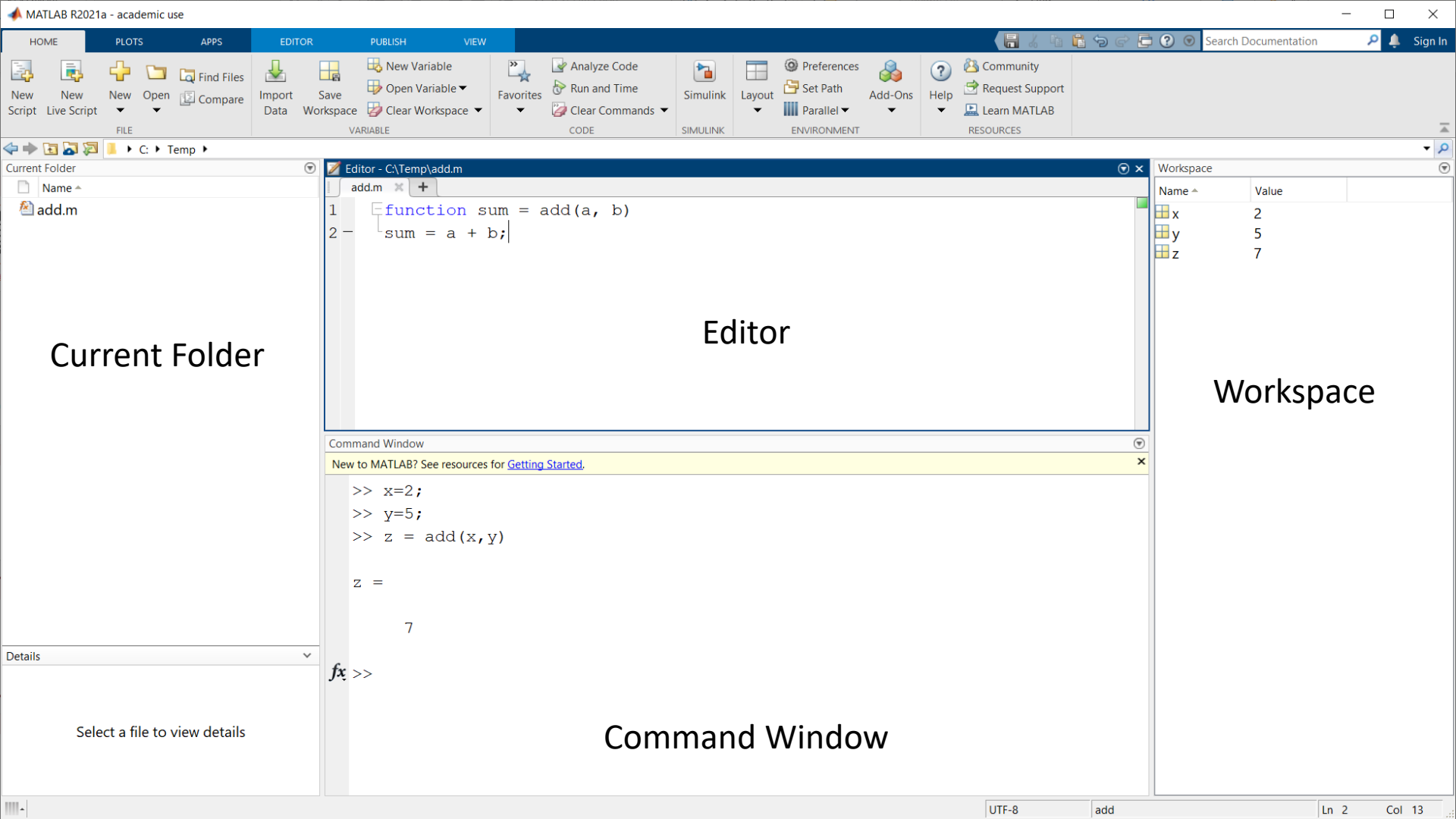
https://www.halvorsen.blog/documents/teaching/courses/matlab

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.


MATLAB R2021a - academic use
HOME
PLOTS
APPS
EDITOR
PUBLISH
VIEW
Search Documentation
Sign In
New Script
New Live Script
New
Open
Find Files
Compare
FILE
Import Data
Save Workspace
New Variable
Open Variable
Clear Workspace
VARIABLE
Favorites
Analyze Code
Run and Time
Clear Commands
CODE
Simulink
SIMULINK
Layout
Preferences
Set Path
Parallel
Add-Ons
ENVIRONMENT
Help
Community
Request Support
Learn MATLAB
RESOURCES
C: ▸ Temp ▸
Current Folder
Name
add.m
Current Folder
Editor - C:\Temp\add.m
add.m
1 function sum = add(a, b)
2 sum = a + b;
Editor
Workspace
Name
Value
x 2
y 5
z 7
Workspace
Command Window
New to MATLAB? See resources for Getting Started.
>> x=2;
>> y=5;
>> z = add(x,y)
z =
7
>>
Command Window
Details
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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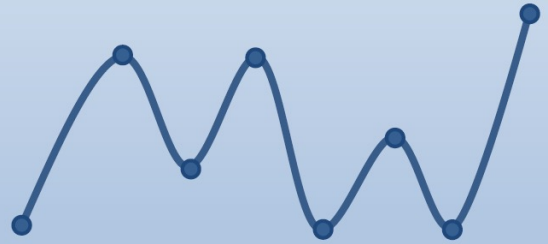

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Part 2

Modelling, Simulation and Control in MATLAB

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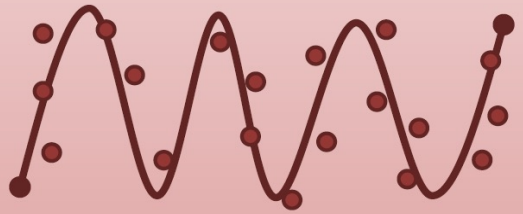

Part 3

Simulink and Advanced Topics in MATLAB

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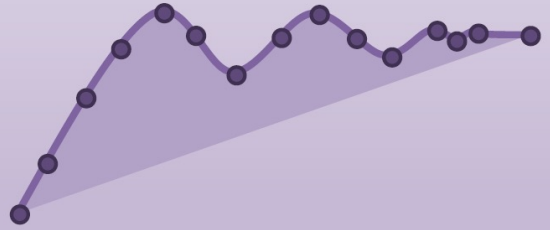

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You will find the **Examples** and **Exercises/Tasks** you shall do inside these Course Manuals

Examples and Exercises/Tasks

Here are some examples of the Code Examples and Exercises/Tasks you find in the Course Manuals:

Variables:

Variables are defined with the assignment operator, "=". MATLAB is dynamically typed, meaning that variables can be assigned without declaring their type, and that their type can change. Values can come from constants, from computation involving values of other variables, or from the output of a function.

Example:

```
>> x = 17
x =
 17
>> x = 'hat'
x =
hat
>> x = [3*4, pi/2]
x =
   12.0000    1.5708
>> y = 3*sin(x)
y =
   -1.6097    3.0000
```

[End of Example]

Task 3: Vectors and Matrices

Type the following vector in the Command window:

$$x = \begin{bmatrix} 1 \\ 2 \\ 3 \end{bmatrix}$$

Type the following matrix in the Command window:

$$A = \begin{bmatrix} 0 & 1 \\ -2 & -3 \end{bmatrix}$$

Type the following matrix in the Command window:

$$C = \begin{bmatrix} -1 & 2 & 0 \\ 4 & 10 & -2 \\ 1 & 0 & 6 \end{bmatrix}$$

→ Use Use MATLAB to find the value in the second row and the third column of matrix C.

→ Use MATLAB to find the second row of matrix C.

→ Use MATLAB to find the third column of matrix C.

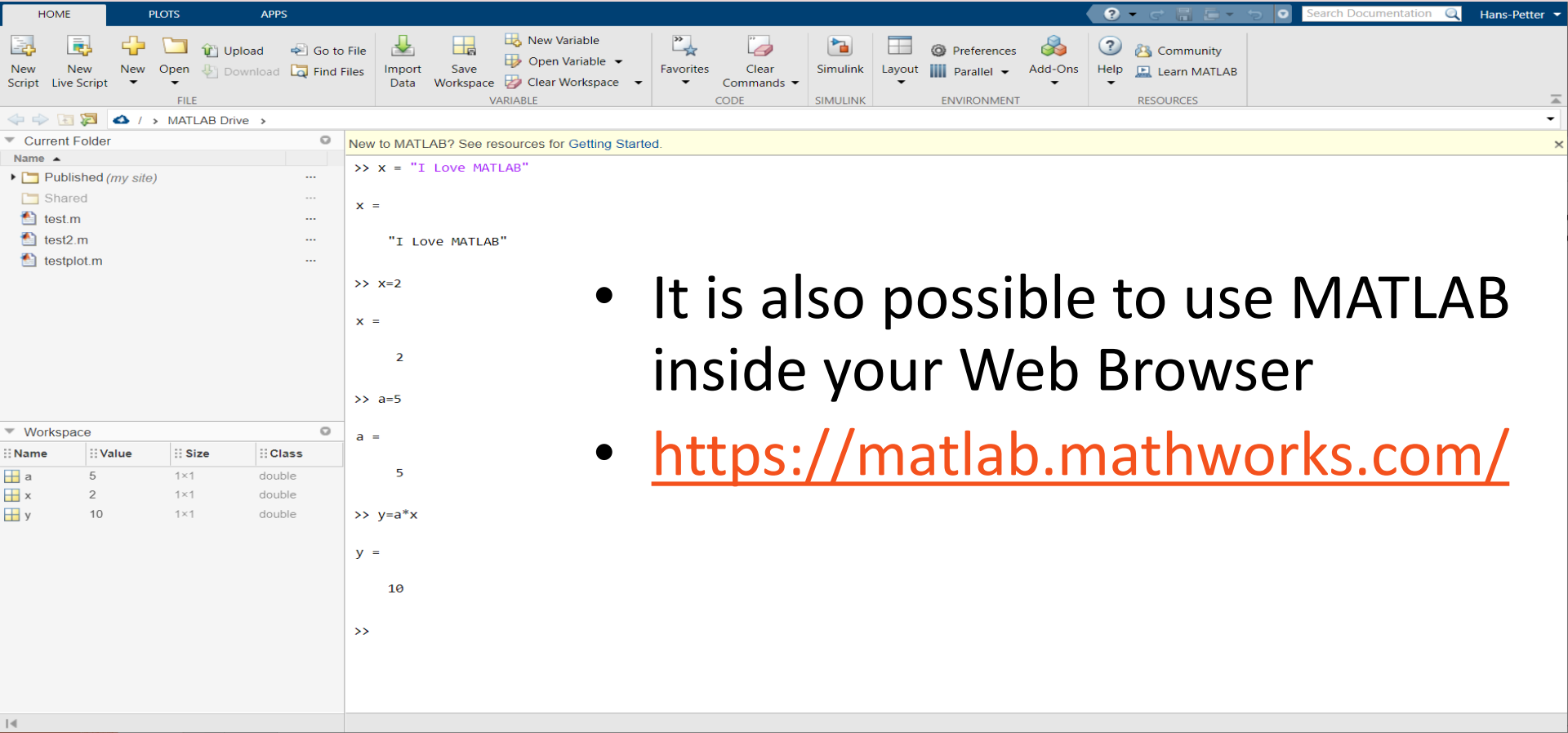
[End of Task]

All the Exercises/Tasks need to be delivered after each Part is finished

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

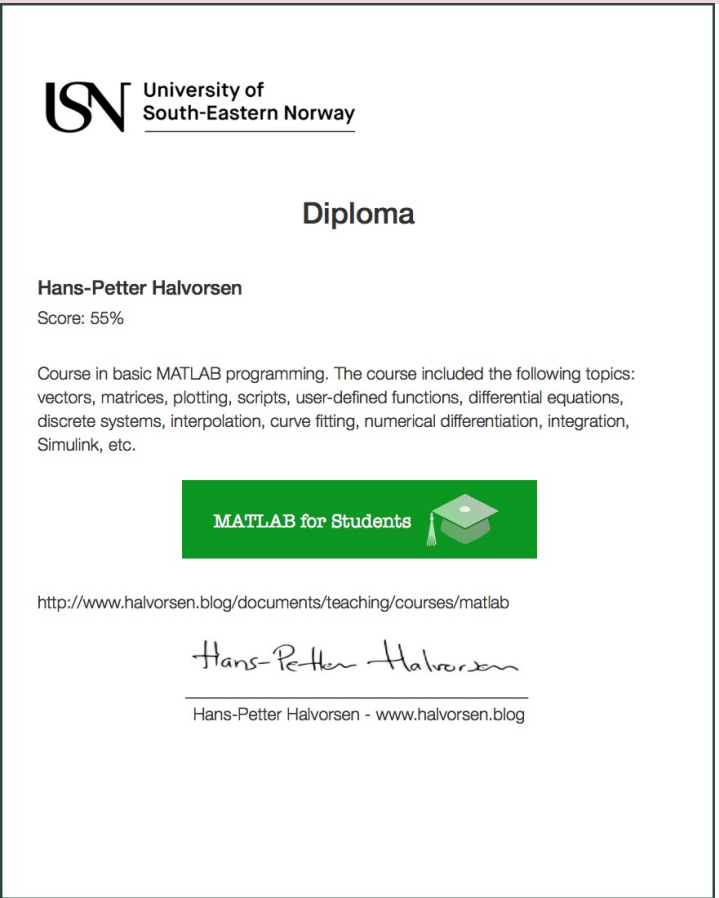


- It is also possible to use MATLAB inside your Web Browser
- https://matlab.mathworks.com/

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



University of South-Eastern Norway

Diploma

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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.

MATLAB for Students

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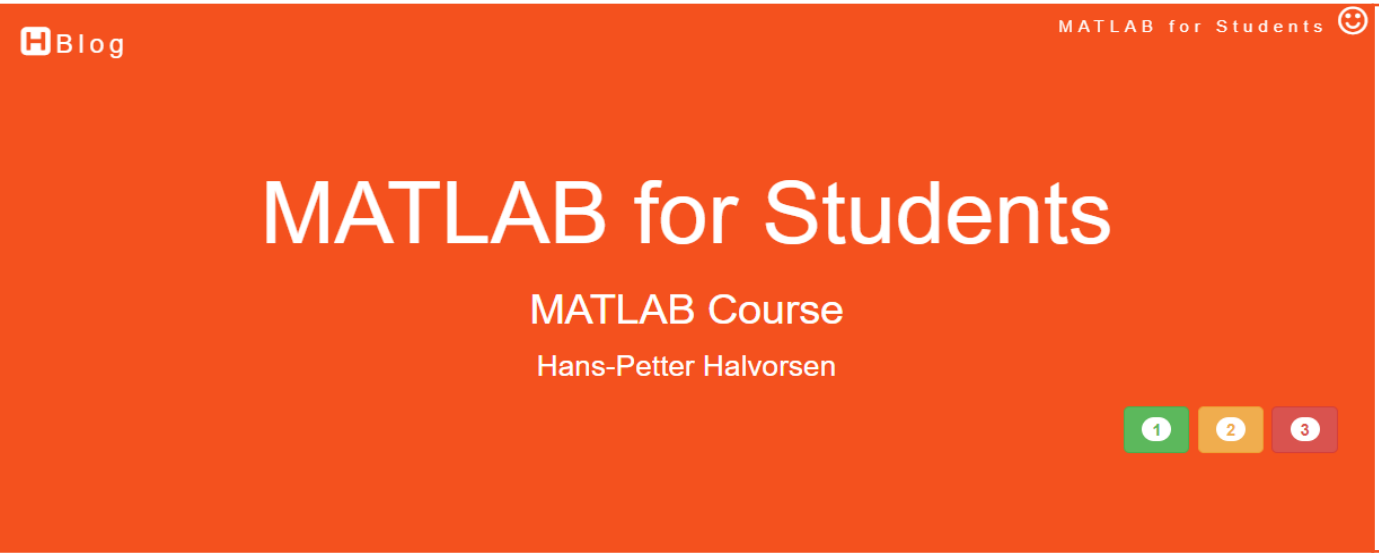
- This is a voluntary course, and you get no grades or credits in this course.
- As an extra service with no additional charge, I will provide you a Diploma.
- If you are absent more than 3 times (out of 10), you will not get a diploma!
- This means you can choose to follow the course outside campus, 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 to get the Diploma.

Web Site



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