



# **Tools for Artificial Intelligence with MATLAB, initiation (TAIM)**

**José Antonio Lázaro**

## **Introduction**

Barcelona, 3, February 2025

# Methodology

- Face-to-face class
- Slides on *My\_Tech\_Space* <https://campus.talent.upc.edu/inici/>
- Participation



- Questions at any time, arranging meetings when necessary

# Presentations



The screenshot shows the UPC My Tech [SPACE] interface. The top navigation bar includes links for INICIO, MENSAJES, SMS, NOTAS, SERVICIOS ACADÉMICOS, and ADMINISTRACIÓN. The main content area displays the course '72410400 - INTRODUCCIÓN A LA COMPUTACIÓN CUÁNTICA PARA INTELIGENCIA ARTIFICIAL (ED. 2024-2025)' with tabs for Presentación, Aulas, Foros, Cuestionarios, Participantes, and Encuestas. The 'Participantes' tab is active, showing a list of participants with columns for Material, Calificaciones, Foro de aula, and Participantes de aula. A search bar and a 'Perfil' dropdown menu are visible at the top of the participant list.

## Professor data:

José Antonio Lázaro

Address any doubt to: [jose.antonio.lazaro@upc.edu](mailto:jose.antonio.lazaro@upc.edu) with the subject: **TAIM doubt student name surname**

<https://campus.talent.upc.edu/activitat/PLYpZQXaR1InroQLLvdb0mDGJ7y4ro/aules/~b1V6MWkxMjJ5MIU9/participants/>

# Objectives

... create **basic** AI projects in the three main branches: supervised learning, unsupervised learning and reinforcement learning, thus acquiring a basis for future projects

# Contents

- Introduction to AI with MATLAB.
- Tools for adjusting curves.
- Practical machine learning methods for classification problems.
- Basic deep learning tools for image recognition.
- Introduction to intelligent controllers learning from experience (reinforcement learning) with MATLAB.

# Requisites

Students should have previous training in:

- Linear Algebra or Introduction to Mathematics (or equivalent)
- Fundamentals of Physics (or equivalent)
- Computer Fundamentals (or equivalent)
- Basic knowledge of Python (or equivalent)

Home > Masters and postgraduate courses > Training > Learning capsule on Introduction to Quantum Computing for Artificial Intelligence

PRESENTATION

TRAINING  
CONTENTS

LEARNING  
METHODOLOGY

TEACHING STAFF

REQUEST  
INFORMATION

## ● Evaluation criteria

### Assistance

At least 80% attendance during class hours is required.

### Solving exercises, quizzes or exams

Individual tests with the aim of evaluating the degree of learning and acquisition of skills.

# Introduction to MATLAB

- You have a full free (as UPC's student) MATLAB licence at Mathworks -> Generate, if you do not have your account with:
- <https://serveistic.upc.edu/ca/distsoft/el-servei/upc-student-software-licenses>

## Software distribution agreements for students and faculty

### Software agreements for students and teachers

AUTOCAD and other AutoDesk products

JMP Student Edition

ArcGIS PRO

MATLAB and other Mathworks modules

MINITAB

MICROSOFT Office365

MICROSOFT Azure Dev Tools for Teaching

LABVIEW, Multisim and other National Instruments products

SOLIDWORKS for Teaching

MAPLE

IBM SPSS Statistics and AMOS

SIMSCALE



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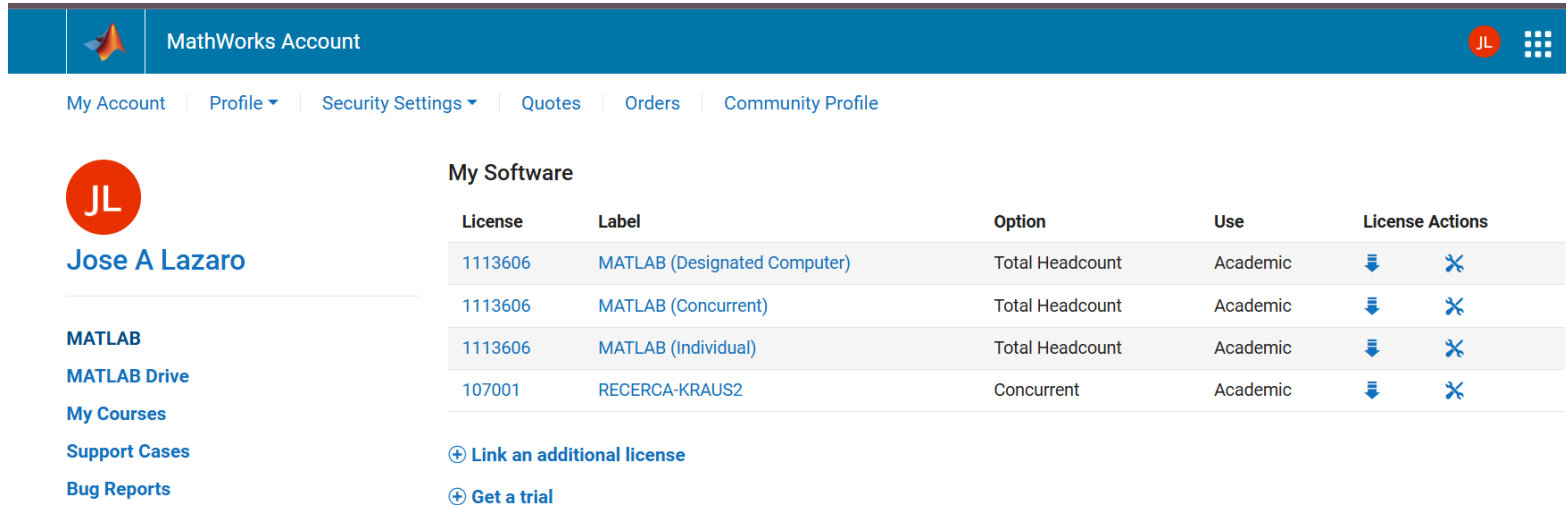
SIMSCALE

# Introduction to MATLAB

## MATLAB and other Mathworks modules

- The agreement with Mathworks allows you to use software that can be downloaded directly from their website. To download the software, you must create an account at <http://es.mathworks.com> using your UPC email address.
  - Once the account has been registered with the university email, the student can access the Mathworks UPC website:  
<https://es.mathworks.com/academia/tah-portal/politecnica-de-catalunya-31113606.html>
  - You will access the website with your UPC credentials and you will be prompted for your mathworks account to associate it with your UPC account.
  - **Important information:** during the registering process, it asks if you want to associate the account with the university, answer 'No'. Once created, access the new account to check that everything is OK and then the account can be associated with the university.
  - This website gives access to technical support, online courses and specific teaching tools.
  - In this FAQ you will find all the [information about the MATLAB license of the UPC](#).
  - Our license includes all matlab toolboxes.
  - The license allows the use of Matlab online (<https://matlab.mathworks.com/>) and Matlab Mobile that connects to MathWorks cloud with your account.
- \*\*\* Every year, in April, you must reactivate the license. In order to do this you must select "Activate using Internet" in the "Home" tab of Matlab, section "Resources", select "Help > Licensing > Activate Software" and restart MATLAB after activation is complete.

# Introduction to MATLAB



**MathWorks Account**

My Account | Profile ▾ | Security Settings ▾ | Quotes | Orders | Community Profile

**Jose A Lazaro**

MATLAB  
MATLAB Drive  
My Courses  
Support Cases  
Bug Reports

**My Software**

License	Label	Option	Use	License Actions
1113606	MATLAB (Designated Computer)	Total Headcount	Academic	⬇️ ✕
1113606	MATLAB (Concurrent)	Total Headcount	Academic	⬇️ ✕
1113606	MATLAB (Individual)	Total Headcount	Academic	⬇️ ✕
107001	RECERCA-KRAUS2	Concurrent	Academic	⬇️ ✕

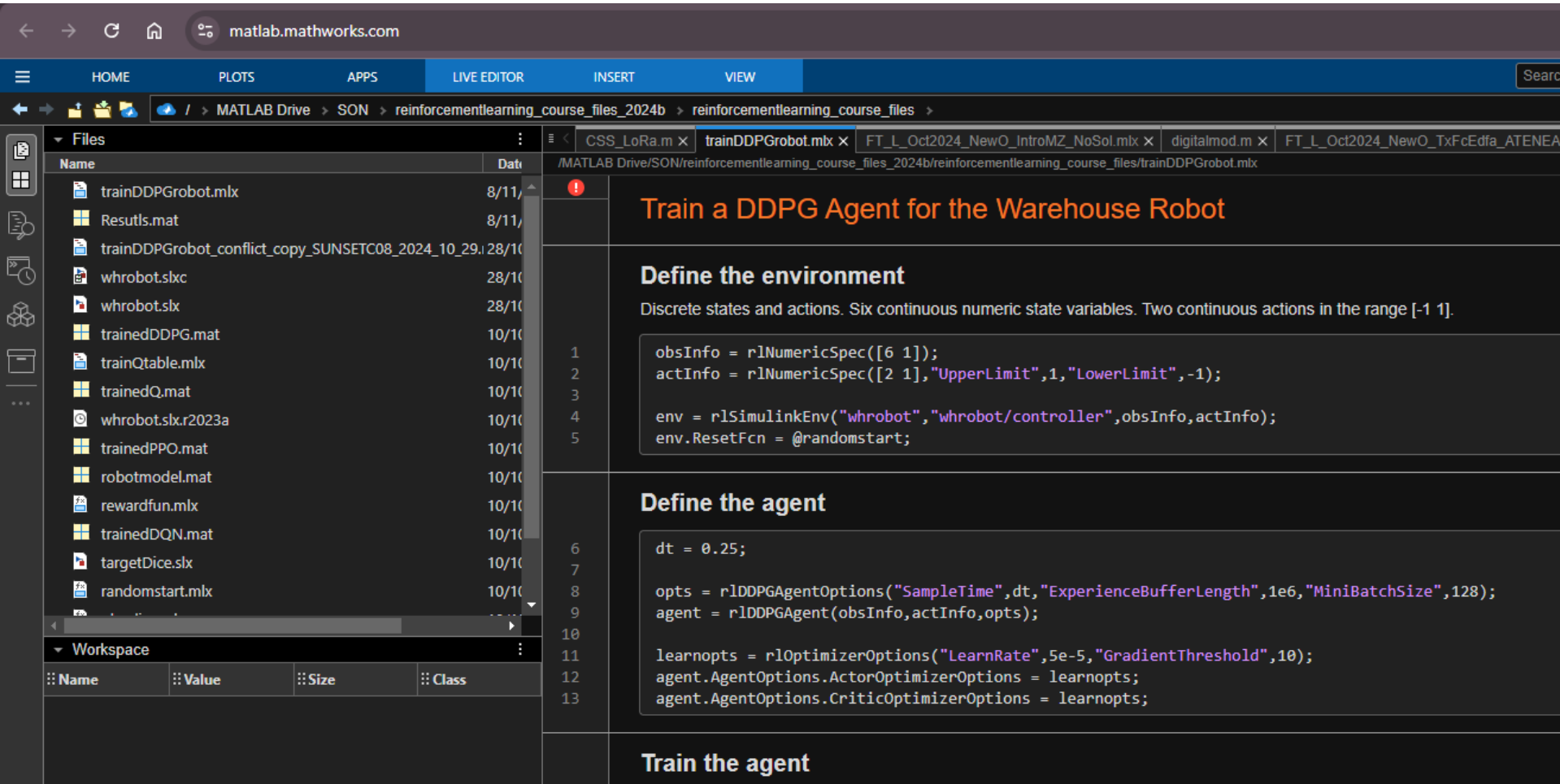
⊕ Link an additional license  
⊕ Get a trial

You will get a profile similar to this one.

You can work:

- At the Classroom's PC
- In a local installation on your PC
- With Matlab Online

# Introduction to MATLAB



The screenshot shows the MATLAB Live Editor interface. The top navigation bar includes tabs for HOME, PLOTS, APPS, LIVE EDITOR, INSERT, and VIEW. The current project is located at `/MATLAB Drive / SON / reinforcementlearning_course_files_2024b / reinforcementlearning_course_files`. The file explorer on the left lists various files, including `trainDDPGrobot.mlx`, `Results.mat`, `trainDDPGrobot_conflict_copy_SUNSETC08_2024_10_29_128/10`, `whrobot.slxc`, `whrobot.slx`, `trainedDDPG.mat`, `trainQtable.mlx`, `trainedQ.mat`, `whrobot.slx.r2023a`, `trainedPPO.mat`, `robotmodel.mat`, `rewardfun.mlx`, `trainedDQN.mat`, `targetDice.slx`, and `randomstart.mlx`. The workspace at the bottom shows a table with columns for Name, Value, Size, and Class.

The main editor displays the following code:

```

1  obsInfo = rlNumericSpec([6 1]);
2  actInfo = rlNumericSpec([2 1], "UpperLimit", 1, "LowerLimit", -1);
3
4  env = rlSimulinkEnv("whrobot", "whrobot/controller", obsInfo, actInfo);
5  env.ResetFcn = @randomstart;

6
7
8  opts = rlDDPGAgentOptions("SampleTime", dt, "ExperienceBufferLength", 1e6, "MiniBatchSize", 128);
9  agent = rlDDPGAgent(obsInfo, actInfo, opts);
10
11  learnopts = rlOptimizerOptions("LearnRate", 5e-5, "GradientThreshold", 10);
12  agent.AgentOptions.ActorOptimizerOptions = learnopts;
13  agent.AgentOptions.CriticOptimizerOptions = learnopts;

```

The code is organized into sections: "Train a DDPG Agent for the Warehouse Robot", "Define the environment", "Define the agent", and "Train the agent".

# Introduction to MATLAB

Do you have any basic knowledge of MATLAB?

- If not -> Good News: In 2 hours you can get the basics!
- <https://matlabacademy.mathworks.com/details/matlab-onramp/gettingstarted>



New to MATLAB? Start here:

**MATLAB Onramp**

2 hours | Languages

Get started quickly with the basics of MATLAB.

# Introduction to MATLAB

- You can do it in English: <https://matlabacademy.mathworks.com/details/matlab-onramp/gettingstarted>
- Or in Spanish: <https://matlabacademy.mathworks.com/es/details/matlab-onramp/gettingstarted> (maybe not the last version, though.)

[Página de inicio](#) | [Mis cursos](#) | [Online Training Suite](#)



## MATLAB Onramp

Iniciar el curso

[Compartir curso](#) | [Compartir certificado y progreso](#) | [Referencia rápida](#) | [Configuración](#)

0%

**i** Curso actualizado a la versión más reciente. [Más información.](#)

Learn the basics of MATLAB® through this introductory tutorial on commonly used features and workflows. Get started with the MATLAB language and environment so that you can analyze science and engineering data.

### Módulos del curso

> [Course Overview](#) 5 minutos

> [Commands](#) 20 minutos

> [MATLAB Desktop and Editor](#) 15 minutos

> [Vectors and Matrices](#) 15 minutos

> [Array Indexing and Modification](#) 15 minutos

> [Array Calculations](#) 5 minutos

### Acerca de este curso



Formato: [A su ritmo](#)

Duración: Aproximadamente 2 horas

Idioma: English ([cambiar](#))

### Funcionalidades

- Ejercicios prácticos con comentarios automáticos
- Acceda a MATLAB a través de su navegador web
- Informe de progreso y certificado del curso disponibles para comparar

Creado por:



**Renee Coetsee**  
MathWorks