NextWaveSTEM | Course Guide

COURSE: Advanced Machine Learning & Artificial Intelligence

Designed for learners in Grades 9-12.

COURSE DESCRIPTION

Students learn about computers, artificial intelligence, and their real-life applications. From facial recognition to autonomous cars, they will find out that computers and A.I. are everywhere around us!

LESSON SEQUENCE AND LEARNING TARGETS

Lesson One: What is Artificial Intelligence?

- ❏ I can explain what artificial intelligence is.
- ❏ I can name real-life examples of machine learning.

Lesson Two: Smart Cities, Homes, and Schools

- ❏ I can explain the term "SMART."
- ❏ I can apply the term "SMART" to cities, homes, and schools.

Lesson Three: Smart City, Home, and School Design

- ❏ I can explain the purpose of a "SMART city."
- ❏ I can design a digital concept map for a smart city/home/school.

Lesson Four: Facial Recognition and Python

- ❏ I can explain how a computer recognizes an image.
- ❏ I can explain issues that arise with reliance on systems that detect issues.

Lesson Five: AI is Changing the World!

- ❏ I can describe the stages of the AI project cycle.
- ❏ I can brainstorm an AI project.

Lesson Six: AI Inventive

- ❏ I can identify pros/cons of AI in society.
- ❏ I can plan my AI invention design.

Lesson Seven: Programming with Datasets

- ❏ I can program my invention.
- ❏ I can identify the skills needed to build an AI invention.

Lesson Eight: Build Your Invention

- ❏ I can identify the importance of agents and sensors.
- ❏ I can generate ideas to improve my invention.

Lesson Nine: AI for All

- ❏ I can incorporate knowledge to create a presentation on “Artificial Intelligence is for Everyone.”
- ❏ I can support my opinion with factual information.

Lesson Ten: Final Presentations-AI for Everyone

- ❏ I can create and present a project on “Artificial Intelligence is for Everyone.”

COURSE OVERVIEW AND PACING GUIDE

Lesson	**Learning Targets**	**Materials Needed**	**Pacing** (60 min.)
What is Artificial Intelligence?	❑ I can explain what artificial intelligence is. ❑ I can name real-life examples of machine learning.	- Classroom whiteboard and markers - Computers or Tablets with Internet Connection	**Engage**: Pique Interest and Prior Knowledge (5 min.) **Explore**: What is AI? (15 min.) **Explain**: Evolution of AI? (15 min.) **Elaborate**: Machine Learning (20 min.) **Evaluate**: Learning Review (5 min.)
Smart Cities, Homes, and Schools	❑ I can explain the term “SMART.” ❑ I can apply the term “SMART” to cities, homes, and schools.	- Chart paper - Post its in 2 or 3 colors - Markers/Pens - Computers or Tablets with Internet Connection	**Engage**: Pique Interest and Prior Knowledge (5 min.) **Explore**: Where does Smart start? (15 min.) **Explain**: Getting Smarter (10 min.) **Elaborate**: Preparing for the future (20 min.) **Evaluate**: Learning Review (5 min.)
Smart City, Home, and School Design	❑ I can explain the purpose of a “SMART city” ❑ I can design a digital concept map for a	- Access to Google Docs - Resources created the previous lesson	**Engage**: Pique Interest and Prior Knowledge (5 min.) **Explore**: Why Smart? (10 min.)

	smart city/home/school.	- Chart paper - Post its - Computers or Tablets with Internet Connection	**Explain**: Planning for the future (15 min.) **Elaborate**: Mapping it Out (20 min.) **Evaluate**: Learning Review (5 min.)
Facial Recognition and Python	❑ I can explain how a computer recognizes an image. ❑ I can explain issues that arise with reliance on systems that detect issues.	- Demonstration access to Python - OpenCV Pre-Installed on Demonstration computer - Classroom whiteboard and markers - Computers or Tablets with Internet Connection	**Engage**: Pique Interest and Prior Knowledge (5 min.) **Explore**: Seeing is Believing (10 min.) **Explain**: The Benefits of Photo Recognition (10 min.) **Elaborate**: Photo Recognition in Python (30 min.) **Evaluate**: Learning Review (5 min.)
AI is Changing the World!	❑ I can describe the stages of the AI project cycle. ❑ I can brainstorm an AI project.	- Access to MINDMUP - Computers or Tablets with Internet Connection	**Engage**: Pique Interest and Prior Knowledge (5 min.) **Explore**: AI Project Cycle (15 min.) **Explain**: Understand your Challenge (15 min.) **Elaborate**: Find Your Passion (20 min.) **Evaluate**: Learning Review (5 min.)

AI Inventive	❑ I can identify pros/cons of AI in society. ❑ I can plan my AI invention design.	- Computers or Tablets with Internet Connection - Students Worksheet from Lesson 5 for Reference if needed - MindMUp Map from Lesson 5 - Access to Tinkercad, Emaze, GoogleSlides	**Engage**: Pique Interest and Prior Knowledge (5 min.) **Explore**: Thinking through impacts (15 min.) **Explain**: Why Your Invention? (15 min.) **Elaborate**: Prepare to Share (20 min.) **Evaluate**: Learning Review (5 min.)
Programming with Datasets	❑ I can program my invention. ❑ I can identify the skills needed to build an AI invention.	- Ready to use: Scratch, Cognimates, Python - Computers or Tablets with Internet Connection	**Engage**: Pique Interest and Prior Knowledge (5 min.) **Explore**: What are datasets? (15 min.) **Explain**: Which program do I use? (15 min.) **Elaborate**: Machine Learning (20 min.) **Evaluate**: Learning Review (5 min.)
Build Your Invention	❑ I can identify the importance of agents and sensors. ❑ I can generate ideas to improve my invention.	- Computers or Tablets with Internet Connection - Worksheets from previous days if needed	**Engage**: Pique Interest and Prior Knowledge (5 min.) **Explore**: Agents and Sensors? (15 min.) **Explain**: Data Decisions (15 min.) **Elaborate**: Build Your Invention (20 min.)

		- Scratch, Cognimates, Python	**Evaluate**: Learning Review (5 min.)
AI for All	❑ I can incorporate knowledge to create a presentation on “Artificial Intelligence is for Everyone.” ❑ I can support my opinion with factual information.	- Computers or Tablets with Internet Connection - Python, Scratch, Cognimates, Google Drawing - Access to student sheets and notes from previous lessons.	**Engage**: Pique Interest and Prior Knowledge (5 min.) **Explore**: What is AI Imagery (15 min.) **Explain**: Design of AI Imagery (15 min.) **Elaborate**: Discover AI Imagery (20 min.) **Evaluate**: Learning Review (5 min.)
Final Presentations-AI for Everyone	❑ I can create and present a project on “Artificial Intelligence is for Everyone.”	- Computers or Tablets with Internet Connection - Google Slides - Google Drawing - Access to previous materials from lessons	**Engage**: Pique Interest and Prior Knowledge (5 min.) **Explore**: What is a pitch? (10 min.) **Explain**: Why make it relevant? (10 min.) **Elaborate**: Create and Present (20 min.) **Evaluate**: Learning Review (5 min.)

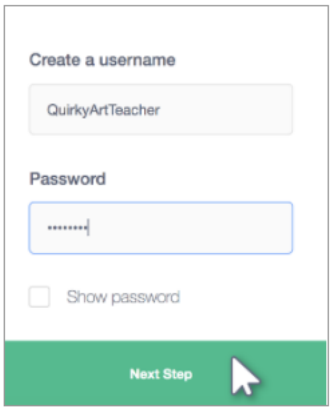
COURSE PREPARATION

Please set up Teacher Accounts for the new software and applications that the student's will be using.

Use the following instructions to create your Teacher Account, make classes, and add students.

Creating Teacher Account

Visit this link to get started: https://scratch.mit.edu/educators/register

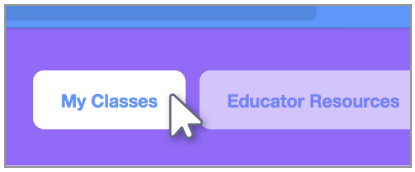


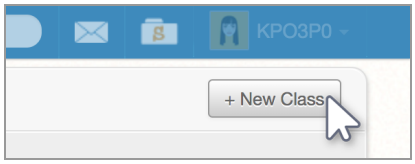
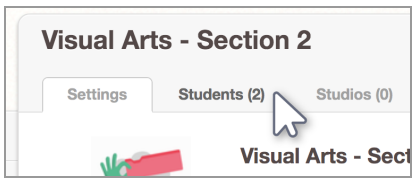
Click through the registration process.

- Log into your email, and confirm your email address.
- Now you can log into your teacher account at scratch.mit.edu!

Creating Classes

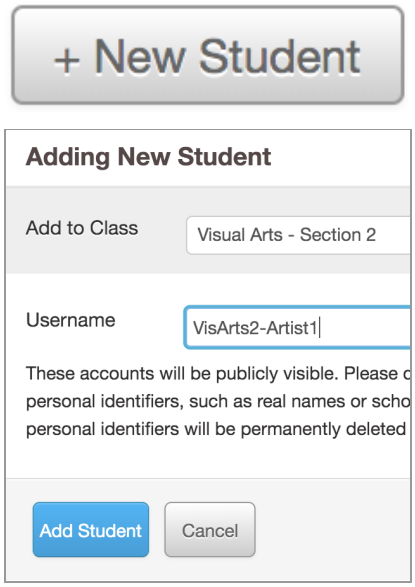
Creating classes allows you to manage groups of students, and create studios where your students can add their projects.

Creating Classes	
	• Once you've successfully logged into your Teacher Account, there will be a bar at the top of the screen with three options. • Select My Classes.

	• To create a class, click the + New Class button at the top right of the page. • Enter the class name and description.
	• Once you've created a class, you can add students. • Click the Students tab to begin adding students.

Adding Students

There are three ways to add students to your class.

Adding Individual Students	
	• Click + New Student to add students individually. - You will be prompted to create a username for this student. • Make sure that the usernames you create do not contain identifying information about yourself, your students, or your school. • The password for this student username will automatically be set as your username for your teacher account. • Have students log into their accounts and change their passwords.

Python

Download the Python 3 Installer

1. Open a browser window and navigate to the Download page for Windows at python.org.
2. Underneath the heading at the top that says Python Releases for Windows, click on the link for the Latest Python 3 Release - Python 3.x.x. (As of this writing, the latest is Python 3.6.5.)

3. Scroll to the bottom and select either Windows x86-64 executable installer for 64-bit or Windows x86 executable installer for 32-bit.

Run the Installer

Once you have chosen and downloaded an installer, simply run it by double-clicking on the downloaded file. A dialog should appear that looks something like this:

Then just click Install Now. That should be all there is to it. A few minutes later you should have a working Python 3 installation on your system.

Create a Class

To create a class, use the keyword ***class***:

Create a class named MyClass, with a property named x.

Create an object named p1, and print the value of x.

Create a **class** named Person, use the __init__() function to **assign** values for student names.

Students will be able to locate their names upon logging in.