

Learn

The word "Learn" is in a large, black, serif font. To its right is a logo consisting of a black square with the lowercase letters "ai" in white, positioned above a teal vertical bar. Above the black square is a pink horizontal bar.

2022-2023 Syllabus

What is LearnAI?

LearnAI is a free course run by [UofT AI](#) that introduces Artificial Intelligence and Machine Learning concepts to University of Toronto undergraduates. This course is perfect for **all students**, even those with limited CS experience!

Through this course, students will gain a broad set of skills - from Regression to Neural Networks, allowing them to build an attractive employment profile.

Our refined curriculum is complemented by valuable resources such as TAs and mentors! The program consists of a series of lectures and workshops to teach important concepts and to help practice their implementation. Students also have the opportunity to complete a mentored final project to showcase their new skills.

Apply [here](#) by September 24th!

Course Structure:

Lecture Phase (8 lectures – 8 weeks)

(Oct. 1st – Nov. 26th)

- 2 hours weekly: A 1 hour lecture to learn both high-level and technical concepts, followed by a 1 hour workshop to practice coding concepts from that day's topic!
- Meet like-minded people and make some friends!

Project Phase (6 weeks)

Hiring and Project Proposal (1 week)

(Dec. 3rd)

- Form a group of 3-5 people and submit project proposals to your mentor! This mentor will guide you throughout the project.

Work phase (5 weeks)

(Jan 14th – Feb. 11th)

- 2 hours weekly: Group project work – mentors help with questions/clarification!

Optional Final Lecture

(Feb. 18th)

- A short discussion-style lecture on current research in AI and the ethics of AI followed by an hour-long networking session.

The tentative timing for this year's LearnAI sessions is 12 noon to 2PM on Saturdays. The location of the lectures and confirmation regarding timings will be communicated to students who have been accepted into LearnAI 2022-2023.

Topics Covered

October 1: Introduction & Preparation

- Course introduction, commitments, meet the team!
- What is artificial intelligence and machine learning?
- AI history, applications, and why it matters!

October 8: NumPy

- NumPy array operations
- Linear algebra & statistical operations
- Data standardization & ML preprocessing
- Tutorial: General application of NumPy concepts

October 15: Pandas

- Pandas dataframe operations
- Detecting and fixing missing values
- Tutorial: General application of Pandas concepts

October 22: Classification & Regression

- Understanding classification & regression in ML
- Loss & generalization
- Tutorial: Creation of a regression model

October 29: Neural Networks I

- Expressivity problem & the perceptron
- Activation functions & Neural Networks (NNs)
- Tutorial: Keras NN implementation & hyperparameter tuning

November 5: Neural Networks II

- Gradient descent & backpropagation
- Testing and validation (loss & accuracy)
- Tutorial: Preprocess data and create a classification NN

November 19: Computer Vision

- Intro to Computer Vision & image manipulation in NumPy
- Kernels, convolutions & Convolutional Neural Networks (CNNs)
- Tutorial: Create a CNN to tackle an object-recognition problem

November 26: Natural Language Processing

- Intro to Natural Language Processing (NLP)
- Word embeddings, machine translation & Recurrent Neural Networks (RNNs)
- Tutorial: Create an RNN to tackle a language-based problem

Auxiliary Content

After our partnership with AI Commons (2021 -2022), LearnAI has substantially improved in quality. However, unfortunately, there are many topics we won't get to present given the timespan of the course.

So, in an effort to keep the course shorter, any lectures we do not deem essential will be made available for you to study on your own. We call these lectures *auxiliary content*.

Do not be mistaken: These lectures are very much useful to you!

Although the lectures are subject to some change, here is the existing *auxiliary content*:

<i>Python</i>	<i>Visualization</i>	<i>KNNs</i> <i>K-Nearest Neighbours</i>
<i>Dimensionality</i>	<i>Decision Trees</i>	<i>GANs</i> <i>Generative Adversarial NNs</i>
<i>Transfer Learning</i>	<i>Low code and AutoML</i>	<i>AI Project</i>
<i>Ethics & Bias in AI</i>	<i>Reinforcement Learning</i>	<i>Naive Bayes</i>

If nothing else, we expect students to explore the *Ethics & Bias in AI* lecture, as it's important to have some exposure to the real-world effects AI can have – good and bad.

Communication

LearnAI communications will occur almost exclusively on the “LearnAI Students (2022-2023)” channel on the “UofT AI” Discord server (<https://discord.gg/M2CRy65TRy>). The only exceptions are a few emails sent to U of T emails; For example, a letter of acceptance or rejection, and, if accepted, a Discord invite close to the start date, so watch for that! We'll also send out an email distributing this syllabus.

FAQ

What will be LearnAI's delivery method?

Currently, we plan for all LearnAI sessions to be in-person with the exception of the Lecture on November 05 (This lecture will most likely be offered in a hybrid manner). That being said, we must be flexible: This plan is tentative and subject to the rules, regulations, and suggestions imposed by the government and the University of Toronto.

What are the requirements to apply?

The only requirement is that you are currently a University of Toronto undergraduate student, or will be when the course runs!

Some Python experience is recommended, but not required:

- We even have a lecture on Python in our *auxiliary content* to get you started!
- Note that having little programming experience will make the course more time-consuming, so you will have to be ready to put in the work!

Do I have to be in Computer Science to apply?

No, LearnAI is specifically designed to be open to all programs and majors! However, the course will be more challenging for students with little programming experience.

Does LearnAI replace a traditional U of T education in AI?

Not at all. We have different goals than the university, and nowhere near the breadth of the university courses. We do not aim to replace formal education. Consider this course to be an aid: This program aims to provide students an edge in practical ML!

I've just applied. When can I expect a response?

A response regarding your application will be sent out around September 29th.

Is this course recognized by the university? Will it affect my GPA?

No, this course is not officially recognized by the university, and is extra-curricular in nature. LearnAI is managed, formulated and run by UofT AI. LearnAI is not CCR recognized.

Not only will it not affect your GPA, but LearnAI doesn't have any grades at all – yay! We recognize grades motivate some students, but in response to our efforts in running this free course, we expect self-motivated students to be ready to improve their skills and take their future into their own hands!

Do we get to choose the project that we want to pursue?

Absolutely! This is part of the fun of the project phase! Just remember that you will be in a group of 3-5 people, so your group must agree on the project idea.

Will there be additional guidance after the program ends?

Yes and no. Due to limited time and resources, we can't ask more of our (unpaid) student TAs than their original time commitment. That being said, the "LearnAI Students (2022-2023)" Discord channel will remain open after the course ends for questions and guidance. If your project mentor wishes, they may continue working on the project with you even after the official end-date!

Still have questions?

Send us a message on the "learnai-logistic-questions" channel on the "UofT AI" Discord server (<https://discord.gg/M2CRy65TRy>)