Learn ai

2021-2022 Syllabus

What is LearnAI?

LearnAI is a free course teaching undergraduate students artificial intelligence (AI) and machine learning (ML) at the University of Toronto – designed with beginners in mind!

Exposure to ML is limited before graduate school, and LearnAI fills this gap by teaching the intuition of ML concepts, its implementation in Python, as well as some theory!

Having recently partnered with AI Commons, our content is currently being taught world-wide in emerging countries for free!

Why join LearnAI?

For the most part, this program was developed with three niche groups in mind:

- Individuals looking to **learn practical AI** (coding and intuition)

- Computer science (CS) students eager to **learn AI & prep for U of T courses**

- Non-CS students with **very limited access** to U of T's AI courses

- Anyone **looking for an edge** in their respective field!

If these points describe you in any way, LearnAI is right for you!

We offer a refined curriculum and provide valuable resources to help such as TAs & mentors! The program consists of a series of lectures and tutorials to teach the concepts and practice their implementation, as well as a project phase to refine your practical ML skills in a group.

Most of all, our goal is to reward those who take initiative in their education, enriching their lives and careers!

LearnAI Application: bit.ly/learnai21-22

The final application deadline is October 1st!

Who runs LearnAI?

UofT AI is a University of Toronto club creating opportunities for undergraduates to become involved in machine learning!

Its dedicated student members run a variety of initiatives, including educational programs like LearnAI, competitions such as ProjectX, conferences, and more!

Check us out!

UofT AI Linktree: linktr.ee/UofTAI

Structure

LearnAI is sharing a curriculum with AI Commons! However, the AI Commons program takes 4 months, which is an excessive length for LearnAI, and so we have taken a subset of the content: The lectures we feel are the most vital to your success!

Lecture Phase (8 lectures – 8 weeks)

- 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 (5 weeks)

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

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

Schedule

Week of October 11: Lecture phase begins

Week of December 6: Project phase begins

Week of December 20: Break for the holidays

Week of January 1: Project phase resumes

Mid-January: Program finishes

Topics Covered

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

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

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

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

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

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

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

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 partnering with AI Commons, LearnAI has improved in quality and grown in scope! Unfortunately, this means there are many lectures we won't get to present, given the timespan of the course – otherwise, the program could take as long as 5 months!

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*:

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

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.

Scheduling

Generally the course timeslot takes place on an afternoon during the weekend, so as to not overlap with U of T classes. The exact time is generally determined by a When2Meet administered to all accepted students at the start of the course.

Communication

LearnAI communications will occur almost exclusively on the LearnAI 2021-2022 Slack. 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 Slack invite close to the start date (mid-October), so watch for that! We'll also send out an email distributing this syllabus.

FAQ

Will LearnAI be online?

Currently, we plan for the LearnAI lectures to be online and the project phase meetings to take place in-person. Lectures may consist of hundreds of people, whereas for project phase meetings, groups may meet separately to ensure students' safety.

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 was 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, and 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?

You can usually expect a response within a month, since acceptances are sent out in batches. Final acceptances will be sent out around October 1st, which is the application deadline.

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 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 Slack workspace will remain open after the course ends for questions and guidance, and if your project mentor so wishes, they may continue working on the project with you after the official end-date!

I applied but never heard back. Why not?

To ensure we're only accepting U of T students, applying to LearnAI requires entering a valid U of T email and student number. It's possible that if one of these entries did not meet our expectation, the application could be deleted. Only then would no acceptance or rejection letter be sent.

Still have questions?

Email us at general@uoft.ai with '*Learn*AI' in the subject!