



# Artificial Intelligence

PROFESSIONAL PROGRAM

Stanford | ONLINE

# Quick Facts

**DELIVERY:** Online, Instructor-paced cohort

**HOURS TO COMPLETE:** 10 weeks per course | 10-15 hours per week

**PRICING:** \$1950 per course

## LEARNING EXPERIENCE INCLUDES

- Depth and breadth of content
- Industry examples
- Online lectures
- Auto-graded coding assignments
- Personalized support from Course Facilitators
- Collaboration via Slack
- Live group sessions

# Overview

Artificial intelligence is revolutionizing nearly every aspect of our society, and the pace of AI advancement in the last few years has been truly remarkable. Recent technologies in neural networks, deep learning, and foundation models have led to powerful new AI capabilities and applications. But how do you stay on top of a field where things are changing so fast?

In the Artificial Intelligence Professional Program, you can access the same rigorous, cutting-edge content we teach in our graduate courses at Stanford, but on a flexible schedule designed for working professionals.

In each course, you will join a group of more than a hundred other learners who wish to grow and deepen their knowledge and skills in artificial intelligence. You'll have the opportunity to meet your peers from organizations around the globe, test your know-how in challenging assignments, and get support and feedback from Course Facilitators who have taken the graduate courses and are working in industry.

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This course is an excellent introduction to various deep generative models and the theory behind them. The instructor is very knowledgeable and goes deep into the theory behind generative models. This is complemented with very hands on homeworks to reinforce both the theoretical and practical implementation of the algorithms, and different flavors of the algorithms.

**Reza O.,**  
**Senior Staff Machine Learning Engineer**  
**(XCS236 Deep Generative Models)**

# Who Is This Program For?

This program is designed for working professionals who wish to study Artificial Intelligence at an advanced level, but without the constraints of a traditional graduate program. Courses in the program offer the rigor and depth expected of graduate-level education, providing learners with a comprehensive understanding of both the theoretical and practical aspects of the subject matter.

More than 5,000 people from over 85 countries have successfully completed courses in the program.

## TOP 10 COUNTRIES

United States	<b>60%</b>
United Kingdom	<b>6%</b>
India	<b>4%</b>
Canada	<b>3%</b>
Germany	<b>3%</b>
Mexico	<b>2%</b>
Australia	<b>2%</b>
Switzerland	<b>2%</b>
Spain	<b>2%</b>
Singapore	<b>1%</b>

## TOP 10 JOB TITLES

Software Engineer	<b>22%</b>
Data Scientist	<b>19%</b>
AI/ML Engineer	<b>7%</b>
Director/VP	<b>5%</b>
Researcher	<b>4%</b>
Solutions/ Software Architect	<b>3%</b>
Analyst	<b>2%</b>
CEO/CTO	<b>2%</b>
Engineering Manager	<b>2%</b>
Software Developer	<b>2%</b>

## TOP 10 INDUSTRIES

Information Technology & Software	<b>37%</b>
Banking/ Financial Services	<b>20%</b>
AI & Robotics	<b>6%</b>
Higher Education & Research	<b>5%</b>
Medicine & Healthcare	<b>4%</b>
Aerospace & Defense	<b>4%</b>
Business Services	<b>3%</b>
E-commerce	<b>3%</b>
Consulting	<b>2%</b>
Government	<b>2%</b>



This course offers an in-depth exploration of the mechanisms powering ChatGPT, providing clarity on its effectiveness. The course skillfully blends theoretical knowledge with practical applications, equipping learners to tackle real-world problems using AI.”

**Samir R., CEO (XCS224N: Natural Language Processing with Deep Learning)**



## OUR COURSES COVER MANY OF THE MAJOR BRANCHES OF AI, INCLUDING:

- Machine Learning
- Deep Learning
- Supervised and Unsupervised Learning
- Reinforcement Learning
- Graph Neural Networks
- Deep Learning for Computer Vision

## THE COURSES WILL EQUIP YOU WITH THE SKILLS AND CONFIDENCE TO:

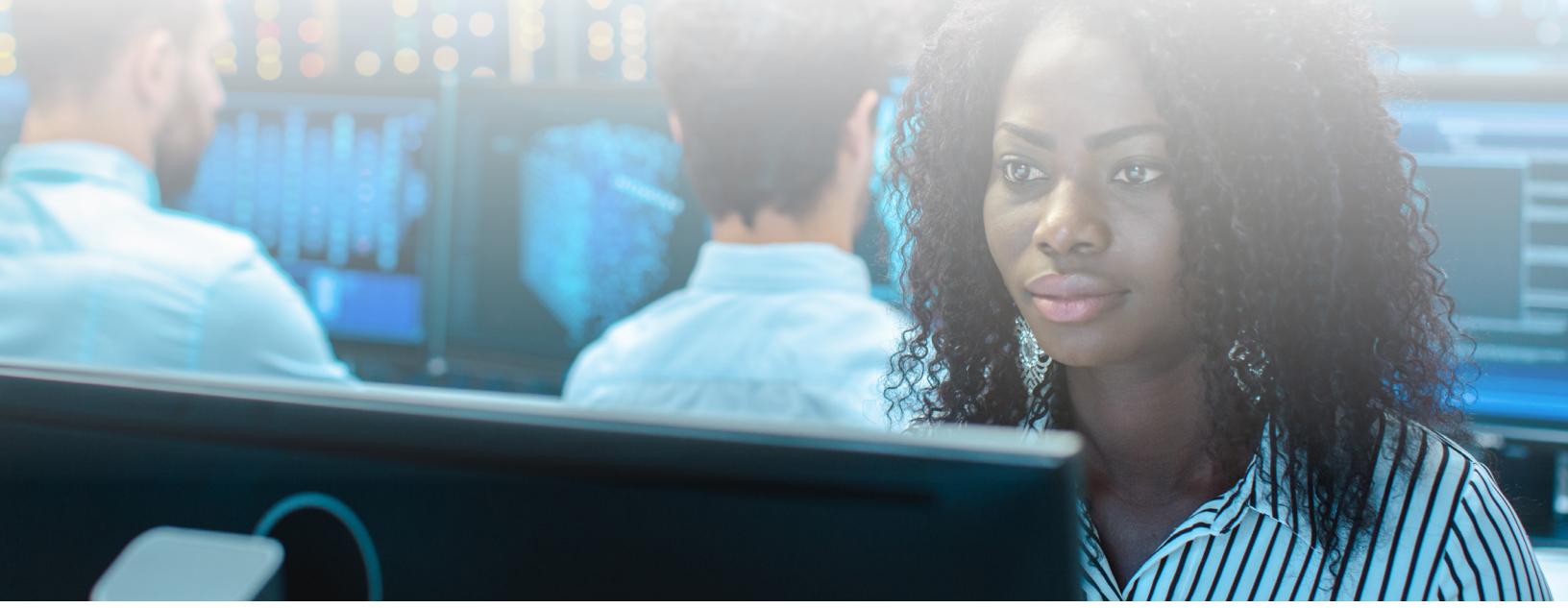
- Build your own models and algorithms without the constraints of off-the-shelf solutions.
- Innovate and create new models, tools, and algorithms to tackle real-world challenges.
- Effectively debug your code, and fine-tune and optimize model parameters for better results.
- Evaluate the performance of AI models and implement generative language models.
- Perform few-shot and zero-shot learning with pre-trained language models.
- Understand research results and conduct your own research in the field.

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The Stanford AI Professional Program has been a rigorous and rewarding experience for me, providing a strong foundation in cutting-edge technologies taught by renowned researchers and educators from Stanford. Despite the challenges of balancing a full-time job, I dedicated early mornings, late nights, and weekends to successfully complete the program. As I reached the end of the program, I felt exhausted but fulfilled.

During my last course, I became interested in the application of meta-learning to supply chain challenges. This led me to write a paper on the topic, which was accepted by the prestigious IEEE International Conference on Artificial Intelligence 2023.”

– Beilei Z.  
**Data Scientist, Intel Corp.**



# Courses

## ARTIFICIAL INTELLIGENCE: PRINCIPLES AND TECHNIQUES

- Get a solid understanding of foundational artificial intelligence principles and techniques, such as machine learning, state-based models, variable-based models, and logic.
- Implement search algorithms to find the shortest paths, plan robot motions, and perform machine translation.
- Adapt to preferences and limitations using constraint satisfaction problems (CSPs).
- Define logic in your algorithms with syntax, semantics, and inference rules.

## MACHINE LEARNING

- Gain a broad introduction to machine learning and statistical pattern recognition.
- Develop a deep understanding of machine learning algorithms as you learn to build them from scratch.
- Build the theoretical and practical skills you need to apply machine learning to real-world problems.
- Explore recent applications of machine learning, such as robotic control, data mining, bioinformatics, and text and web data processing.

## MACHINE LEARNING WITH GRAPHS

- Explore computational, algorithmic, and modeling challenges specific to the analysis of graphs.
- Leverage state-of-the-art graph neural networks to make better predictions over graph-structured data.
- Master the mechanics of PyTorch Geometric to build your own graph neural networks.
- Learn to identify recurrent and significant patterns of interconnection in real-world data through network motifs, subgraph algorithms, and graph-based recommender systems.

## NATURAL LANGUAGE PROCESSING WITH DEEP LEARNING

- Explore the fundamental concepts of deep learning for NLP.
- Design, implement, and understand your NLP neural network models using Pytorch.
- Represent word meaning, identify semantic relationships between words, and make large-scale word predictions with language models.
- Train a re-implementation of GPT to answer questions through pre-training and finetuning.

## REINFORCEMENT LEARNING

- Gain a solid introduction to the field of reinforcement learning and learn about the core approaches and challenges in the field, including generalization and exploration.
- Design and implement RL algorithms on a large scale with linear value function approximation and deep RL techniques.
- Model and optimize your strategies with policy-based RL such as score functions, policy gradient, and REINFORCE.
- Evaluate and enhance your RL algorithms with bandits and MDPs.

## DEEP GENERATIVE MODELS

- Develop a deep understanding of the role of generative models across artificial intelligence and machine learning.
- Explore challenges and complexities of the practical implementation of generative models across various AI tasks.
- Implement a range of generative models, such as autoregressive models, normalizing flow models, energy-based models, and score-based models.
- Design generative models using popular frameworks.

## DEEP LEARNING FOR COMPUTER VISION

- Design and train deep neural networks for key computer vision tasks.
- Use optimization techniques like gradient descent and dropout to enhance model performance.
- Build models for image classification, object detection, segmentation, and captioning.
- Analyze neural network behavior using visualization and diagnostics.
- Experiment with generative models, such as diffusion models and CLIP.
- Gain proficiency in deep learning frameworks for large-scale vision model development.

## DEEP REINFORCEMENT LEARNING

- Design, implement, and train deep RL agents using core frameworks like policy-gradient, actor-critic, and Q-learning methodologies.
- Learn when and how to apply different reinforcement learning frameworks, from tabular methods to deep RL and multi-task learning.
- Design adaptive agents that generalize across tasks through meta-RL, goal-conditioned policies, and unsupervised skill discovery, with applications in robotics and language modeling.
- Study hierarchical policy structures in reinforcement and imitation learning, and their role in enabling efficient exploration.



# Teaching Team

All courses within the program are taught by Stanford faculty. These accomplished professors, who also lead graduate courses on campus, bring a wealth of knowledge and expertise to each online course. You can expect the same rigorous curriculum and high standards of instruction as those found in a traditional classroom setting, ensuring a rich and engaging education experience.



## ACADEMIC DIRECTOR

**Christopher Manning**

Professor of Computer Science  
and of Linguistics

Associate Director, Stanford  
Institute for Human-Centered  
Artificial Intelligence



**Ehsan Adeli**

Assistant Professor of  
Psychiatry & Behavioral Sciences,  
by courtesy, of Computer Science



**Emma Brunskill**

Associate Professor  
Computer Science



**Stefano Ermon**

Associate Professor  
Computer Science



**Jure Leskovec**

Professor  
Computer Science



**Fei-Fei Li**

Sequoia Capital Professor  
Computer Science



**Percy Liang**

Associate Professor  
Computer Science



**Tengyu Ma**

Associate Professor  
Computer Science



**Chelsea Finn**

Assistant Professor  
Computer Science and  
Electrical Engineering



**Christopher Ré**

Associate Professor  
Computer Science



**Dorsa Sadigh**

Associate Professor  
Computer Science

# FAQs

## Is the program in-person or online?

The courses are fully online with multiple live sessions throughout the course.

## How many courses are in the program?

There are currently eight courses in the program. We regularly assess our offerings and incorporate new courses into the program to ensure we provide the most advanced and up-to-date content.

## How long are the courses?

Courses take place over a 10-week period.

## Do I have to take courses in a prescribed order?

No, you can take the courses in any order you choose as long as you meet the prerequisites. If you are less familiar with the subject, we recommend that you consider taking [Artificial Intelligence: Principles and Techniques \(XCS221\)](#) first, but it is not required.

## Do I have to take all the courses in the program?

No, you can take a single course, or you can take all of the courses. The choice is yours, based on your interests, schedule, and budget.

## Can I take more than one course at a time?

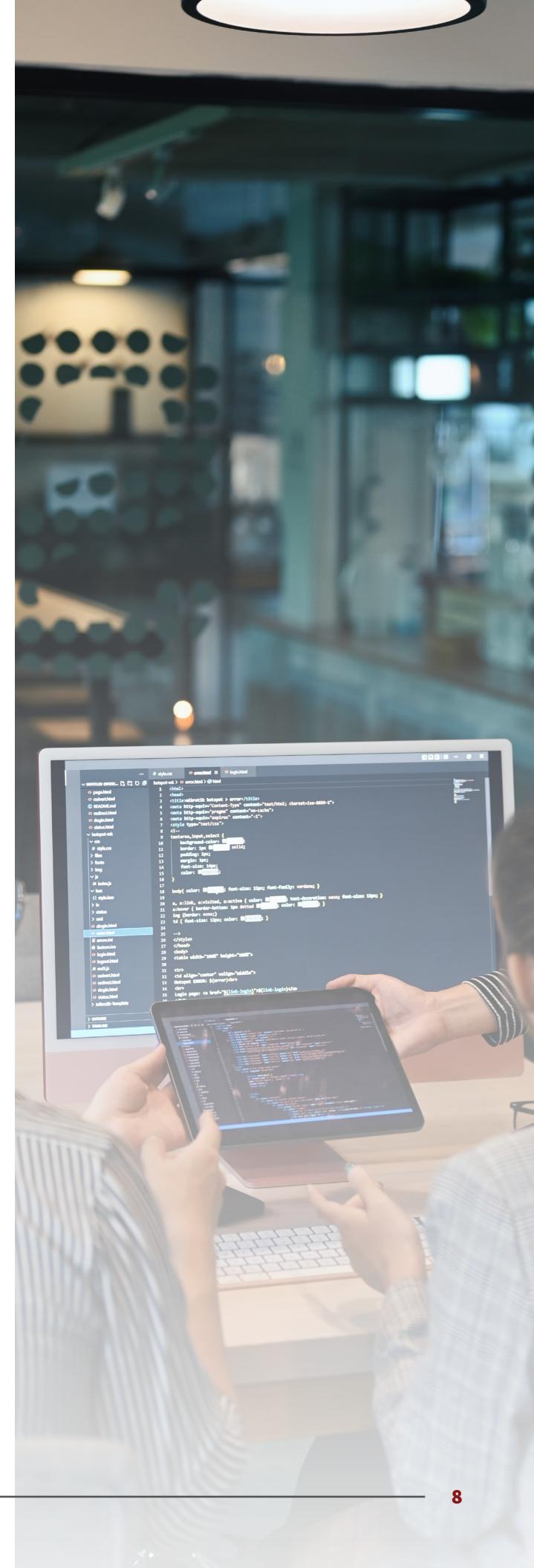
We don't recommend taking more than one course at the same time, but it is not prohibited.

## How many people are in the courses?

Each course has approximately 100-200 learners.

## Do I need to apply before I can enroll in the program?

Yes, you must complete [this short application](#) prior to enrolling in courses in the program. The application allows you to share more about your interest in joining, as well as verify that you meet the prerequisite requirements needed to make the most of the experience.





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This is a very thorough course, combining lectures in cutting edge research and hands-on coding examples. It is very intense with lots to pack in (which is what I'd expect from a Stanford course) but very engaging and enjoyable”.

**Matt C., Data Scientist (XCS224W, Machine Learning with Graphs)**

## What are the prerequisites for enrolling?

- **Proficiency in Python:** Coding assignments will be in Python. Some assignments will require familiarity with basic Linux command line workflows.
- **College Calculus and Linear Algebra:** You should be comfortable taking (multivariable) derivatives and understand matrix/vector notation and operations.
- **Probability Theory:** You should be familiar with basic probability distributions (Continuous, Gaussian, Bernoulli, etc.) and be able to define concepts for both continuous and discrete random variables: Expectation, independence, probability distribution functions, and cumulative distribution functions.

## What can I expect from the lectures?

The pre-recorded lecture videos are adapted from the original Stanford on-campus graduate courses. They will be available to stream at your convenience.

## What can I expect from the course assignments?

Each course is different, but courses typically include a combination of coding assignments and written homework. Coding assignments will require an environment set-up; autograders are available for troubleshooting and feedback. All assignments are adapted from the original graduate course homework.

## Where are students located?

Our AI courses attract learners from all over the world. While the majority are located in North America, we have many learners from Europe, Asia, and South America. Learners often form study groups with classmates located in the same time zone.

## What resources are available if I need help with a concept or assignment?

Stanford-affiliated Course Facilitators are available to help with content-related questions. All Course Facilitators have thrived in the graduate-equivalent course at Stanford and/or demonstrated significant industry experience. You can schedule 1-1 calls with them and contact them via Slack or email. Some Course Facilitators also hold office hours. There is approximately one Course Facilitator for every 30 learners.

## **Will I have the opportunity to interact with the course faculty?**

This program utilizes pre-recorded lecture videos with Stanford faculty. Throughout the program, you will get a chance to interact with Stanford-affiliated Course Facilitators who took the original graduate course and work in the industry. While not guaranteed, we always try to schedule a session with faculty, where you can ask questions about the field.

## **Will I be able to interact with peers or staff in the course(s)?**

Yes. Each course has a lively Slack community that enables you to ask questions, share ideas, and network with your fellow learners. Course Facilitators are also active on the Slack channel.

## **When was the content last updated?**

All courses are up to date. After each graduate course ends, we lead a conversation with faculty to determine whether any changes are needed for the professional course offering and make them based on faculty guidance.

## **What type of grade will I receive?**

Courses are pass/fail. To pass a course, you will need to complete the required assignments and receive an overall score of 70% or higher for the course.

## **What credential will I earn?**

You will earn a digital Certificate of Achievement for each course you successfully complete. The Certificate of Achievement will be specific to the course completed. For example, when you complete the Machine Learning course you will receive a Certificate of Achievement in Machine Learning.

In addition, when you successfully complete three courses in the program you will receive a digital Professional Certificate in Artificial Intelligence from the Stanford School of Engineering. There is no deadline to complete the three courses required to earn the certificate.

## **How long will I have access to the materials?**

Course materials are available for 90 days after the course ends.

**LEARN MORE**





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