# Neural Networks and Deep Learning

deeplearning.ai

**About this Course**
If you want to break into cutting-edge AI, this course will help you do so. Deep learning engineers are highly sought after, and mastering deep learning will give you numerous new career opportunities. Deep learning is also a new "superpower" that will let you build AI systems that just weren't possible a few years ago.

In this course, you will learn the foundations of deep learning. When you finish this class, you will:
- Understand the major technology trends driving Deep Learning
- Be able to build, train and apply fully connected deep neural networks
- Know how to implement efficient (vectorized) neural networks
- Understand the key parameters in a neural network's architecture

This course also teaches you how Deep Learning actually works, rather than presenting only a cursory or surface-level description. So after completing it, you will be able to apply deep learning to a your own applications. If you are looking for a job in AI, after this course you will also be able to answer basic interview questions.

This is the first course of the Deep Learning Specialization.

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| **Basic Info** | Course 1 of 5 in the Deep Learning Specialization |
| **Level** | Intermediate |
| **Commitment** | 4 weeks of study, 3-6 hours a week |
| **Language** | English<br>Volunteer to translate subtitles for this course |
| **How To Pass** | Pass all graded assignments to complete the course. |

| User Ratings | 4.9 stars |
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## Syllabus

**WEEK 1**

### Introduction to deep learning

Be able to explain the major trends driving the rise of deep learning, and understand where and how it is applied today.

7 videos, 2 readings expand

1. **Video:** Welcome
2. **Video:** What is a neural network?
3. **Video:** Supervised Learning with Neural Networks
4. **Video:** Why is Deep Learning taking off?
5. **Video:** About this Course
6. **Reading:** Frequently Asked Questions
7. **Video:** Course Resources
8. **Reading:** How to use Discussion Forums
9. **Video:** Geoffrey Hinton interview

**Graded:** Introduction to deep learning

**WEEK 2**

### Neural Networks Basics

Learn to set up a machine learning problem with a neural network mindset. Learn to use vectorization to speed up your models.

19 videos, 2 readings expand

1. **Video:** Binary Classification
2. **Video:** Logistic Regression
3. **Video:** Logistic Regression Cost Function
4. **Video:** Gradient Descent
5. **Video:** Derivatives
6. **Video:** More Derivative Examples
7. **Video:** Computation graph
8. **Video:** Derivatives with a Computation Graph
9. **Video:** Logistic Regression Gradient Descent

**Graded:** Neural Network Basics

**Graded:** Logistic Regression with a Neural Network mindset

**WEEK 3**

### Shallow neural networks

Learn to build a neural network with one hidden layer, using forward propagation and backpropagation.

12 videos expand

1. **Video:** Neural Networks Overview
2. **Video:** Neural Network Representation
3. **Video:** Computing a Neural Network's Output
4. **Video:** Vectorizing across multiple examples
5. **Video:** Explanation for Vectorized Implementation
6. **Video:** Activation functions
7. **Video:** Why do you need non-linear activation functions?
8. **Video:** Derivatives of activation functions
9. **Video:** Gradient descent for neural networks
10. **Video:** Backpropagation intuition (optional)
11. **Video:** Random Initialization
12. **Video:** Pieter Abbeel interview

**Graded:** Shallow Neural Networks

**Graded:** Planar data classification with a hidden layer

**WEEK 4**

## Deep Neural Networks

Understand the key computations underlying deep learning, use them to build and train deep neural networks, and apply it to computer vision.

8 videos expand

1. **Video:** Deep L-layer neural network
2. **Video:** Forward Propagation in a Deep Network
3. **Video:** Getting your matrix dimensions right
4. **Video:** Why deep representations?
5. **Video:** Building blocks of deep neural networks
6. **Video:** Forward and Backward Propagation
7. **Video:** Parameters vs Hyperparameters
8. **Video:** What does this have to do with the brain?

**Graded:** Key concepts on Deep Neural Networks

**Graded:** Building your deep neural network: Step by Step

**Graded:** Deep Neural Network Application

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## How It Works

**GENERAL**

**How do I pass the course?**

To earn your Course Certificate, you'll need to earn a passing grade on each of the required assignments—these can be quizzes, peer-graded assignments, or programming assignments. Videos, readings, and practice exercises are there to help you prepare for the graded assignments.

**What do start dates and end dates mean?**

Most courses have sessions that run multiple times a year — each with a specific start and end date. Once you enroll, you'll have access to all videos, readings, quizzes, and programming assignments (if applicable). Peer-graded assignments can only be submitted and reviewed once your session has begun. If you choose to explore the course without purchasing, you may not be able to access certain assignments. If you don't finish all graded assignments before the end of the session, you can enroll in the next session. Your progress will be saved and you'll be able to pick up where you left off when the next session begins.

**What are due dates? Is there a penalty for submitting my work after a due date?**

Within each session there are suggested due dates to help you manage your schedule and keep coursework from piling up. Quizzes and programming assignments can be submitted late without consequence. However, it is possible that you won't receive a grade if you submit your peer-graded assignment too late because classmates usually review assignment within three days of the assignment deadline.

**Can I re-attempt an assignment?**

Yes. If you want to improve your grade, you can always try again. If you're re-attempting a peer-graded assignment, re-submit your work as soon as you can to make sure there's enough time for your classmates to review your work. In some cases you may need to wait before re-submitting a programming assignment or quiz. We encourage you to review course material during this delay.

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**PROGRAMMING ASSIGNMENTS**

**Programming assignments require you to write and run a computer program to solve a problem.**

**What are programming assignments?**

Programming assignments include both assignment instructions and assignment parts. Instructions may include a link to a downloadable starter package that includes starter code, detailed guidelines, and other resources. Assignment parts are similar to individual quiz questions. Each part is a single coding task that can be completed one at a time.

**How are programming assignments graded?**

Programming assignments are graded automatically. If they use a built-in-algorithm you'll see your grade within seconds. If they use a custom grader, you may need to wait up to an hour.

**Can I resubmit a programming assignment?**

You can resubmit all programming assignments to improve your grade. Follow the same steps as submitting a new assignment.

**What do I do if I have trouble submitting my assignment?**

If you have trouble submitting your assignment, we encourage you to visit your course Discussion Forums as many of your peers are likely to have had similar problems and have found a solution. Each programming assignment has its own sub-forum to discuss with peers.

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## Course 1 of Specialization

**Deep Learning Specialization.** Master Deep Learning, and Break into AI


Deep Learning

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## Related Courses


Improving Deep Neural Networks: Hyperparameter tuning, Regularization and Optimization

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Structuring Machine Learning Projects

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Machine Learning: Classification

University of Washington

## Machine Learning: Regression

University of Washington

## Machine Learning Foundations: A Case Study Approach

University of Washington