Neural Networks and Deep Learning

by DeepLearning.AI

About this Course
In the first course of the Deep Learning Specialization, you will study the foundational concept of neural networks and deep learning.

By the end, you will be familiar with the significant technological trends driving the rise of deep learning; build, train, and apply fully connected deep neural networks; implement efficient (vectorized) neural networks; identify key parameters in a neural network's architecture; and apply deep learning to your own applications.

The Deep Learning Specialization is our foundational program that will help you understand the capabilities, challenges, and consequences of deep learning and prepare you to participate in the development of leading-edge AI technology. It provides a pathway for you to gain the knowledge and skills to apply machine learning to your work, level up your technical career, and take the definitive step in the world of AI.

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Basic Info	Course 1 of 5 in the Deep Learning Specialization
Level	Intermediate
Commitment	At the rate of 5 hours a week, it takes roughly 5 weeks to finish each course in the Specialization.
Language	English, **Subtitles:** Chinese (Traditional), Arabic, French, Bengali, Ukrainian, Chinese (Simplified), Greek, Italian, Portuguese (Brazil), Vietnamese, Dutch, Korean, Oriya, German, Pashto, Urdu, Russian, Thai, Indonesian, Swedish, Turkish, Azerbaijani, Spanish, Dari, Hindi, Japanese, Kazakh, Hungarian, Polish
How To Pass	Pass all graded assignments to complete the course.
User Ratings	Average User Rating 4.9

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, 3 readings

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

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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, 7 readings

1. **Video:** Binary Classification
2. **Video:** Logistic Regression
3. **Reading:** Clarification about Upcoming Logistic Regression Cost Function Video
4. **Video:** Logistic Regression Cost Function
5. **Reading:** Clarification about Upcoming Gradient Descent Video
6. **Video:** Gradient Descent
7. **Video:** Derivatives
8. **Video:** More Derivative Examples
9. **Video:** Computation graph
10. **Video:** Derivatives with a Computation Graph
11. **Video:** Logistic Regression Gradient Descent
12. **Video:** Gradient Descent on m Examples
13. **Reading:** Derivation of DL/dz (optional reading)
14. **Reading:** Copy of Clarification about Upcoming Logistic Regression Cost Function Video
15. **Video:** Vectorization
16. **Video:** More Vectorization Examples
17. **Reading:** Clarification of "dz"
18. **Video:** Vectorizing Logistic Regression
19. **Video:** Vectorizing Logistic Regression's Gradient Output
20. **Video:** Broadcasting in Python
21. **Video:** A note on python/numpy vectors
22. **Video:** Quick tour of Jupyter/iPython Notebooks
23. **Video:** Explanation of logistic regression cost function (optional)
24. **Reading:** Deep Learning Honor Code
25. **Reading:** Programming Assignment FAQ
26. **Ungraded Lab:** Python Basics with numpy (optional)
27. **Ungraded Programming Assignment:** Python Basics with numpy (optional)
28. **Ungraded Lab:** Logistic Regression with a Neural Network mindset
29. **Video:** Pieter Abbeel interview

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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, 2 readings

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. **Reading:** Clarification: Activation Function
7. **Video:** Activation functions
8. **Video:** Why do you need non-linear activation functions?
9. **Video:** Derivatives of activation functions
10. **Video:** Gradient descent for Neural Networks
11. **Reading:** Clarification about Upcoming Backpropagation intuition (optional)
12. **Video:** Backpropagation intuition (optional)
13. **Video:** Random Initialization
14. **Ungraded Lab:** Planar data classification with a hidden layer
15. **Video:** Ian Goodfellow interview

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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, 3 readings

1. **Video:** Deep L-layer neural network
2. **Video:** Forward Propagation in a Deep Network
3. **Reading:** Clarification about Getting your matrix dimensions right video
4. **Video:** Getting your matrix dimensions right
5. **Video:** Why deep representations?
6. **Video:** Building blocks of deep neural networks
7. **Reading:** Clarification about Upcoming Forward and Backward Propagation Video
8. **Video:** Forward and Backward Propagation
9. **Video:** Parameters vs Hyperparameters
10. **Reading:** Clarification about What does this have to do with the brain video
11. **Video:** What does this have to do with the brain?
12. **Ungraded Lab:** Building your Deep Neural Network: Step by Step
13. **Ungraded Lab:** Deep Neural Network - Application

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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?

To earn your Certificate, you'll need to earn a passing

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Programming assignments

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

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