

# NVIDIA: Fundamentals of Deep Learning (Coursera)

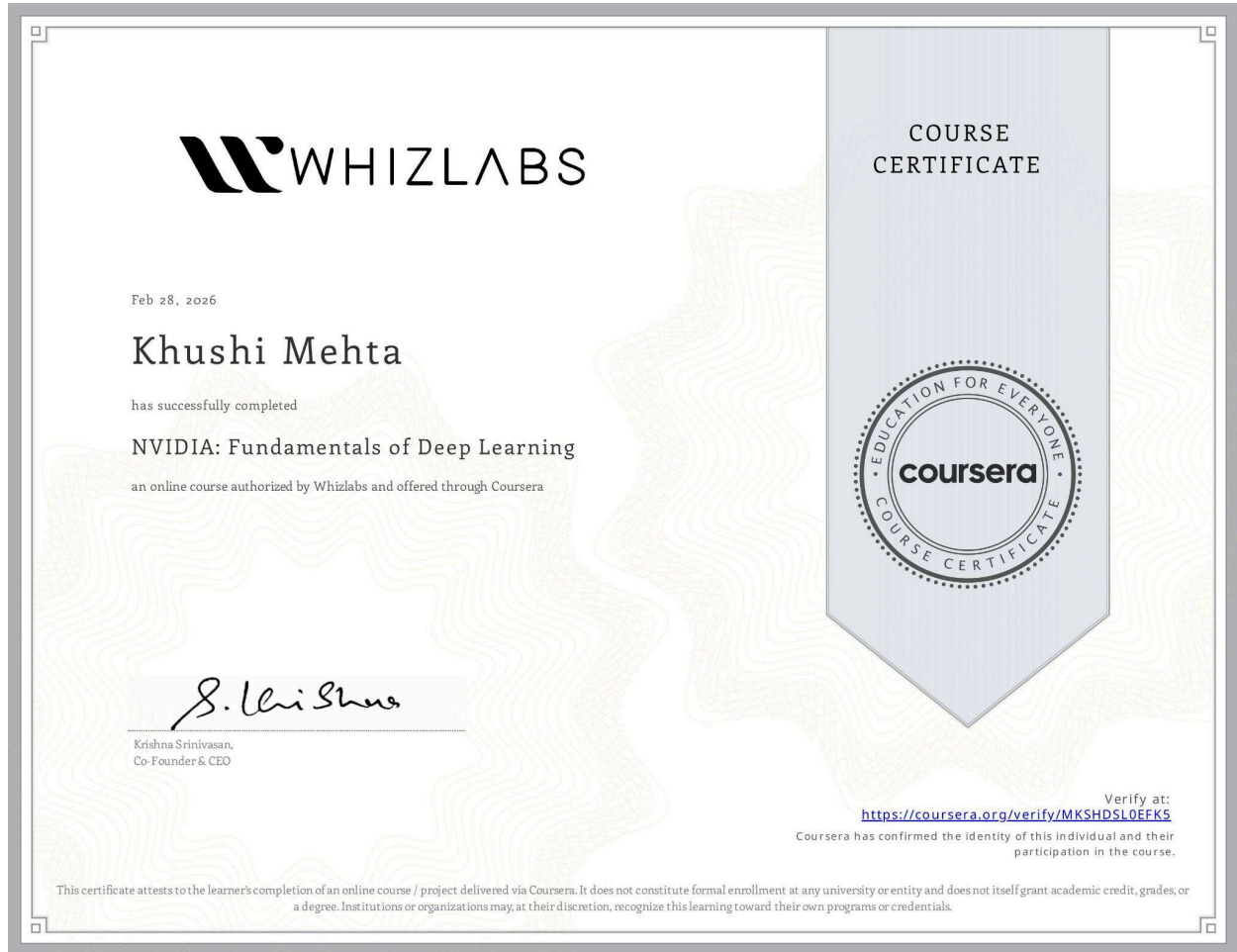
Course : Deep Learning  
Submitted by: Khushi Mehta [102303769]  
B.E. Third Year Batch - 3C54  
Submitted to: Sukhpal Singh



**THAPAR INSTITUTE**  
OF ENGINEERING & TECHNOLOGY  
(Deemed to be University)

Computer Science and Engineering Department  
Thapar Institute of Engineering and Technology  
Jan - June 2026

# Certificate of completion



# Module 1

## Fundamentals of Deep Learning

### Practice Assignment

The screenshot shows the Coursera interface for a knowledge check. On the left is a sidebar with a list of course topics, including 'What is Deep Learning?', 'Expectations from Fundamentals of Deep Learning', 'How Data is processed in a Neuron?', 'Gradient Descent', 'Training a Perceptron - Demo', 'Deep Learning Neural Network - Forward Propagation', 'Backward Propagation - Deep Learning Neural Network', 'Activation Functions', and 'Introduction to Deep Learning & Neural Networks - Knowledge check'. The main content area has the title 'Introduction to Deep Learning & Neural Networks - Knowledge check' and a 'Review Learning Objectives' link. Below this is a 'coach' section with a message: 'Ready to review what you've learned before starting the assignment? I'm here to help.' and buttons for 'Help me practice' and 'Let's chat'. The 'Assignment details' section shows 'Submitted: Feb 28, 6:13 PM IST' and 'Attempts: Unlimited', with a 'Retry' button. The 'Your grade' section displays '100%' and states 'To pass you need at least 60%. We keep your highest score.' with links for 'View submission' and 'See feedback'. At the bottom right is a 'Go to next item' button.

The screenshot shows the feedback page for the knowledge check. At the top, it displays 'Your grade: 100%' and 'Your latest: 100% • Your highest: 100% • To pass you need at least 60%. We keep your highest score.' with a 'Next Item' button. Below this are two questions. Question 1 asks 'Which layer in a DNN is responsible for receiving the raw input data?' with options: 'Input Layer' (selected), 'Hidden Layer', 'It determines the accuracy of the model.', and 'It has no significant role in machine learning'. A green feedback box indicates 'Correct' and provides additional context: 'Correct. The Input Layer is the first layer in a DNN and is designed to take in the raw, unprocessed data. For more information, refer to the video "What is Deep Learning?".' Question 2 asks 'Which type of Deep Neural Network is best suited for processing images and videos?' with options: 'Multi-Layer Perceptron (MLP)', 'Convolutional Neural Network (CNN)' (selected), 'Recurrent Neural Network (RNN)', and 'Generative Adversarial Network (GAN)'. A green feedback box indicates 'Correct' and provides additional context: 'Correct. Convolutional Neural Networks (CNNs) are specifically designed to handle image and video data due to their ability to capture spatial patterns. For more information, refer to the video on "What is Deep Learning?".'

Introduction to Deep Learning & Neural Networks - Knowledge check  
Practice Assignment • 15 min

3. What role do Weights play in an artificial neuron?

- ☐ Introduce non-linearity
- ☒ Determine the importance of each input
- ☐ Provide a constant offset
- ☐ Receive the initial data

**Correct**  
Correct. Weights are associated with each input and control how much influence each input has on the neuron's output. For more information, refer to the video on "Deep Dive into Neurons".

1 / 1 point

4. What is the first step in the computation process of an artificial neuron?

- ☐ Apply the activation function
- ☒ Calculate the weighted sum
- ☐ Transmit the output signal
- ☐ Adjust the bias

**Correct**  
Correct. The first step is to calculate the weighted sum of the inputs, which involves multiplying each input by its corresponding weight and adding the bias. For more information, refer to the video on "Deep Dive into Neurons".

1 / 1 point

5. What is the initial step in the Gradient Descent algorithm?

- ☐ Calculate the gradient of the loss function
- ☐ Update the model parameters
- ☒ Initialize the model parameters with random values
- ☐ Repeat steps until convergence

**Correct**  
This is Correct. The first step is to assign random values to the model's parameters, serving as the starting point for optimization. For more information, refer to the video "Gradient Descent".

## Graded Assignment

Foundations of Deep Learning - Assessment

Review Learning Objectives

**coach**  
Ready to review what you've learned before starting the assignment? I'm here to help.

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**Assignment details**

Due	Attempts
Mar 4, 11:59 PM IST	4 left (5 attempts every 8 hours)
Submitted	
Feb 28, 6:17 PM IST	

[Retry](#)

**Your grade**  
To pass you need at least 50%. We keep your highest score.

**100%**

[View submission](#) [See feedback](#)

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**NVIDIA: Fundamentals of Deep Learning**

- Reading • 10 min
- Meet and Greet  
Discussion Prompt • 10 min
- What is Deep Learning?  
Video • 6 min
- Expectations from Fundamentals of Deep Learning  
Video • 1 min
- How Data is processed in a Neuron?  
Video • 5 min
- Gradient Descent  
Video • 8 min
- Training a Perceptron - Demo  
Video • 8 min
- Deep Learning Neural Network - Forward Propagation  
Video • 4 min
- Backward Propagation - Deep Learning Neural Network  
Video • 4 min
- Activation Functions  
Video • 6 min
- Activation Functions - Demo  
Video • 8 min
- Introduction to Deep Learning & Neural Networks - Knowledge check  
Practice Assignment • Grade: 100%
- Foundations of Deep Learning - Assessment**  
Graded Assignment • Grade: 100%

Module 2  
Advanced Deep Learning Techniques

Foundations of Deep Learning - Assessment

Your grade: 100%

Your latest: 100% • Your highest: 100% • To pass you need at least 50%. We keep your highest scores.

1. What is the mathematical formula for the ReLU activation function?

☒  $f(x) = \max(0, x)$

☐  $f(x) = 1 / (1 + e^{-x})$

☐  $f(x) = \tanh(x)$

☐  $f(x) = x$

**Correct**

This is Correct. The ReLU function outputs the input directly if it is positive, otherwise, it outputs zero. For more information, refer to the video "Training a Neuron Demo".

2. What is the purpose of applying an activation function in a neuron?

☐ To normalize the input values

☒ To introduce non-linearity into the model

☐ To calculate the weighted sum of inputs

☐ To produce the final prediction

**Correct**

This is Correct. Activation functions introduce non-linearity, allowing the network to learn complex patterns in the data. For more information, refer to the video "Deep Learning Neural Network - Forward Propagation".

3. In the equation  $Z = W * X + b$ , what does Z represent?

☐ The weight matrix

☐ The input matrix

☐ The bias vector

☒ The matrix of weighted sums for all neurons in a layer

**Correct**

This is Correct. Z is the result of the matrix multiplication between the weight matrix (W) and the input matrix (X), plus the bias vector (b). It holds the weighted sums for all neurons in a layer before the activation function is applied. For more information, refer to the video "Deep Learning Neural Network - Forward Propagation".

4. What is the primary goal of backpropagation in neural networks?

☐ To initialize the model's parameters

Foundations of Deep Learning - Assessment

This is Correct. Z is the result of the matrix multiplication between the weight matrix (W) and the input matrix (X), plus the bias vector (b). It holds the weighted sums for all neurons in a layer before the activation function is applied. For more information, refer to the video "Deep Learning Neural Network - Forward Propagation".

4. What is the primary goal of backpropagation in neural networks?

☐ To initialize the model's parameters

☐ To make predictions on new data

☒ To minimize the overall error and improve model accuracy

☐ To introduce non-linearity into the model

**Correct**

This is Correct. Backpropagation's core purpose is to iteratively adjust the network's weights and biases to reduce the error between its predictions and the true values, thereby enhancing the model's accuracy. For more information, refer to the video "Backward Propagation - Deep Learning Neural Network".

5. Which step involves feeding the input data through the network to generate a prediction?

☒ Forward Pass

☐ Loss Calculation

☐ Backward Pass

☐ Weight Initialization

**Correct**

This is Correct. The Forward Pass is where the input data travels through the network, layer by layer, resulting in the final output or prediction. For more information, refer to the video "Backward Propagation - Deep Learning Neural Network".

6. Given a categorical feature with values ['red', 'green', 'blue'], what would be the one-hot encoded representation of 'green'?

☐ [1, 0, 0]

☒ [0, 1, 0]

☐ [0, 0, 1]

☐ [1, 1, 0]

**Correct**

This is Correct. In one-hot encoding, each category gets its own binary column. 'green' is the second category, so its representation is [0, 1, 0]. For more information, refer to the video "Deep Learning - Training a Multi-Class Classifier Demo".

# Module 2

## Advanced Deep Learning Techniques

### Practice Assignment

The screenshot shows the Coursera interface for a knowledge check assignment. On the left, a sidebar lists the course content, including 'Foundations of Deep Learning - Assessment' (100%) and 'Module 2: Advanced Deep Learning Techniques'. The main content area displays the assignment title 'Deep Learning & Transfer Learning Techniques - Knowledge check' and 'Review Learning Objectives'. Below this, 'Assignment details' show the submission date as 'Feb 28, 7:42 PM IST' and 'Attempts' as 'Unlimited'. A 'Retry' button is present. The 'Your grade' section shows '100%' with a note: 'To pass you need at least 50%. We keep your highest score.' There are links for 'View submission' and 'See feedback'. At the bottom right, a 'Go to next item' button is visible.

The screenshot shows the feedback page for the knowledge check. At the top, a green banner displays 'Your grade: 100%' and 'Next item' button. Below this, the questions and answers are listed. Question 1 asks: 'What type of data are Convolutional Neural Networks (CNNs) primarily designed to process?'. The options are: 'Sequential data, such as text or time series', 'Tabular data with structured features', 'Grid-like data, such as images and video' (selected), and 'Audio data'. The correct answer is confirmed as 'Grid-like data, such as images and video'. Question 2 asks: 'What is the primary purpose of Pooling Layers in a CNN?'. The options are: 'To increase the spatial dimensions of the data', 'To introduce non-linearity into the model', 'To reduce the spatial dimensions of the data by downsampling' (selected), and 'To generate the final output predictions'. The correct answer is confirmed as 'To reduce the spatial dimensions of the data by downsampling'.

1 / 1 point

3. What is the core concept behind transfer learning?

☐ Training a model from scratch on a small dataset.

☒ Leveraging knowledge from a pre-trained model on a new but related task.

☐ Creating a completely new neural network architecture for every task.

☐ Only using labeled data for training.

Correct

This is Correct. Transfer learning involves taking a model that has been trained on a large dataset and adapting it to a new, but related, task. For more information, refer to the video "Transfer Learning Techniques".

1 / 1 point

4. In which scenario is transfer learning most likely to be beneficial?

☐ You have abundant labeled data for your specific task.

☐ The pre-trained model was trained on a task completely unrelated to your target task.

☐ You have ample computational resources and a large dataset for your new task.

☒ You have a small dataset for your specific task and limited computational resources.

Correct

This is Correct. Transfer learning is particularly advantageous when you have a small dataset and limited computational power, as it allows you to leverage the knowledge from a pre-trained model. For more information, refer to the video "Transfer Learning Techniques".

## Graded Assignment

NVIDIA: Fundamentals of Deep Learning

Foundations of Deep Learning - Assessment  
Graded Assignment • Grade: 100%

Module 2

Advanced Deep Learning Techniques

Overview of Advanced Deep Learning Techniques  
Reading • 10 min

Multi-Class Classification with MNIST Dataset  
Deep Learning  
Video • 13 min

Training Multiclass Classifier - Fit and Evaluate  
Video • 7 min

Understanding the Convolutional Neural Networks  
Video • 8 min

Transfer Learning Techniques  
Video • 6 min

Implementing the Transfer learning on an Image Dataset - Demo  
Video • 9 min

Deep Learning & Transfer Learning Techniques - Knowledge check  
Practice Assignment • Grade: 100%

Advanced Deep Learning Techniques - Assessment  
Graded Assignment • Grade: 80%

Key Takeaways of the course  
Reading • 10 min

Course Conclusion  
Reading • 10 min

Advanced Deep Learning Techniques - Assessment

Review Learning Objectives

coach

Ready to review what you've learned before starting the assignment? I'm here to help.

Help me practice

Let's chat

Assignment details

Due

Mar 6, 11:59 PM IST

Attempts

4 left (5 attempts every 8 hours)

Submitted

Feb 28, 7:45 PM IST

Retry

Your grade

To pass you need at least 40%. We keep your highest score.

80%

View submission

See feedback

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Data Science Elective Basket 20

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coursea.org/learn/fundamentals-of-deep-learning/assignment-submission/rMrDQ/advanced-deep-learning-techniques-assessment/view-feedback

←

Back

Advanced Deep Learning Techniques - Assessment

Graded Assignment • 15 min

🌐

Due

Mar 6, 11:59 PM IST

values move away from zero, hindering learning in deep networks. For more information, refer to the video "Activation Functions".

1 / 1 point

4.

Which activation function is similar to sigmoid but maps the input to a range between -1 and 1?

☐ A: Sigmoid

☒ B: Hyperbolic Tangent (tanh)

☐ C: Rectified Linear Unit (ReLU)

☐ D: Linear

✔ Correct

This is Correct. The tanh function is similar in shape to the sigmoid but its output range is between -1 and 1. This centering often leads to faster convergence during training compared to sigmoid. For more information, refer to the video "Activation Functions - Demo".

1 / 1 point

5.

Which of the following is a common approach in transfer learning?

☐ A: Training a model from scratch with random weights

☐ B: Completely discarding pre-trained models in every training iteration

☐ C: Avoiding the use of neural networks

☒ D: Using a pre-trained model as a feature extractor and fine-tuning only specific layers

✔ Correct

Correct. This is a common approach in transfer learning where the lower layers of a pre-trained model are retained, and only the higher layers are fine-tuned for a specific task. For more information, refer to the video on "Transfer Learning Techniques".