

# NVIDIA: Fundamentals of Deep Learning (Coursera)

Course : Deep Learning

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B.E. Third Year Batch - 3C54

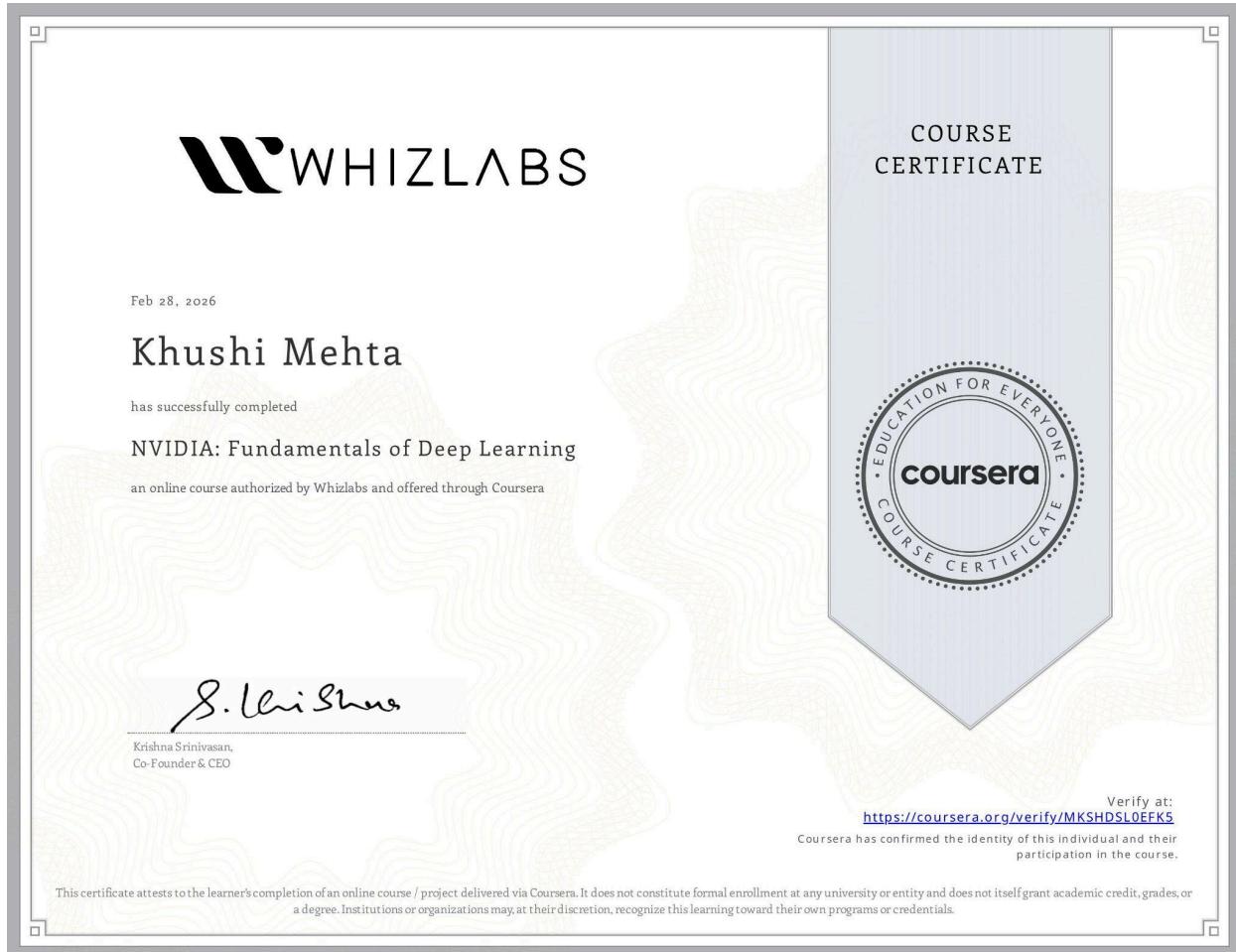
Submitted to: Sukhpal Singh



**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 platform interface for the 'NVIDIA: Fundamentals of Deep Learning' course. On the left, there's a sidebar with a tree view of course content, including 'Meet and Greet', 'What is Deep Learning?', 'Expectations from Fundamentals of Deep Learning', 'Learning', 'How Data is processed in a Neuron?', 'Gradient Descent', 'Training a Perceptron - Demo', 'Deep Learning Neural Network - Forward Propagation', 'Backward Propagation - Deep Learning', 'Activation Functions', 'Activation Functions - Demo', 'Introduction to Deep Learning & Neural Networks - Knowledge check', 'Foundations of Deep Learning - Assessment', and 'Module 2 Advanced Deep Learning Techniques'. The main content area is titled 'Introduction to Deep Learning & Neural Networks - Knowledge check'. It includes a 'coach' section with a message about reviewing learned material, two buttons ('Help me practice' and 'Let's chat'), 'Assignment details' (submitted on Feb 28, 6:13 PM IST, attempts unlimited), and a green box indicating a 'Your grade: 100%' with a note to pass at least 60%. Below this are 'View submission' and 'See feedback' buttons, and social sharing icons for Like, Dislike, and Report an issue. At the bottom right is a 'Go to next item' button.

This screenshot shows the 'view-feedback' page for the 'Introduction to Deep Learning & Neural Networks - Knowledge check' assignment. At the top, it displays 'Your grade: 100%' and notes 'Your latest: 100% • Your highest: 100% • To pass you need at least 60%. We keep your highest score.' A 'Next Item' button is visible. The main content area contains two questions with feedback. 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.'. The feedback for this question is: '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)'. The feedback for this question is: '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?".' Both questions have a '1 / 1 point' indicator.

The screenshot shows a knowledge check assignment titled "Introduction to Deep Learning & Neural Networks - Knowledge check". The assignment consists of five questions. Questions 3, 4, and 5 have feedback sections indicating they are correct.

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

- Introduce non-linearity
- Determine the importance of each input
- C: 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".

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".

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

The screenshot shows a graded assignment titled "Foundations of Deep Learning - Assessment". The assignment page includes a sidebar with course navigation, a "coach" section for review, assignment details, and a summary of the student's grade.

**Assignment details**

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

**Your grade**  
To pass you need at least 50%. We keep your highest score.  
**100%**

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

Your grade: 100%

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

Next item →

1 / 1 point

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

$y(x) = \max(0, x)$

$y(x) = 1/(1 + e^{-x})$

$y(x) = \tanh(x)$

$y(x) = x$

**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 / 1 point

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 / 1 point

3. In the equation  $Z = W^T * X + b$ , 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 sum 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 / 1 point

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 Networks".

5 / 1 point

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 / 1 point

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 a browser window on the Coursera platform. The main title is "Deep Learning & Transfer Learning Techniques - Knowledge check". On the left, there's a sidebar with a navigation tree for the course "NVIDIA: Fundamentals of Deep Learning". The current section is "Advanced Deep Learning Techniques". Under this section, the "Deep Learning & Transfer Learning Techniques - Knowledge check" is selected, showing a grade of 100%. The assignment details indicate it was submitted on Feb 28, 7:42 PM IST with unlimited attempts. A green box at the bottom right shows the grade "100%". Below the grade, there are buttons for "View submission" and "See feedback". At the bottom of the page, there are links for "Like", "Dislike", and "Report an issue".

This screenshot shows the "view-feedback" page for the assignment. The top bar displays "Your grade: 100%" and a "Next item →" button. Below this, a message states "Your latest: 100% • Your highest: 100% • To pass you need at least 50%. We keep your highest score." A "1 / 1 point" indicator is shown. The first question asks: "What type of data are Convolutional Neural Networks (CNNs) primarily designed to process?". It lists four options: "Sequential data, such as text or time series", "Tabular data with structured features", "Grid-like data, such as images and video", and "Audio data". The third option is selected and highlighted with a green border. A "Correct" feedback message explains that CNNs excel at handling grid-like data due to their ability to capture spatial relationships within the data using convolutional layers. A "1 / 1 point" indicator is shown. The second question asks: "What is the primary purpose of Pooling Layers in a CNN?". It lists four options: "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", and "To generate the final output predictions". The third option is selected and highlighted with a green border. A "Correct" feedback message explains that pooling layers downsample the feature maps, reducing their spatial dimensions and making the network more computationally efficient and robust to small shifts in the input. A "1 / 1 point" indicator is shown.

c Data Science Elective Basket 20 c Deep Learning & Transfer Learn + coursera.org/learn/fundamentals-of-deep-learning/assignment-submission/lget0/deep-learning-transfer-learning-techniques-knowledge-check/view-feedback

information, refer to the video "Understanding the Convolutional Neural Networks".

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

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coursera | WHIZLABS Set up a learning plan ★★★

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](#)

Like Dislike Report an issue [Go to next item →](#)

Advanced Deep Learning Techniques - Assessment  
Graded Assignment • 15 min

Due Mar 6, 11:59 PM IST

1 / 1 point

3. Which activation function maps the input to a range between 0 and 1 and is historically popular but suffers from vanishing gradients?

Sigmoid  
 Hyperbolic Tangent (tanh)  
 Rectified Linear Unit (ReLU)  
 Linear

**Correct**  
This is Correct. The sigmoid function has an S-shaped curve that outputs values between 0 and 1. It was widely used in early neural networks, but its gradients tend to become very small as the input 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  
 Hyperbolic Tangent (tanh)  
 Rectified Linear Unit (ReLU)  
 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

Your grade: 80%

Your latest: 80% • Your highest: 80% • To pass you need at least 40%. We keep your highest score.

Next Item →

1 / 1 point

1. When loading the VGG16 model, what does setting include\_top=False signify?

It excludes the final fully connected classification layers of the model  
 It excludes the convolutional base of the model  
 It loads the model without pre-trained weights  
 It disables transfer learning

**Correct**  
This is Correct. include\_top=False removes the original classification layers, allowing you to add your own custom layers for the new task. For more information, refer to the video "Transfer Learning-Demo".

1 point

2. What is the purpose of freezing layers in the VGG16 model during transfer learning?

To prevent the pre-trained weights from being updated during training  
 To slightly speed up the training process  
 To ensure the model learns only from the new data  
 To reduce the model's complexity

**Incorrect**  
This is Incorrect. The model still leverages the knowledge from the pre-trained layers, even if they are frozen. For more information, refer to the video "Transfer Learning-Demo".

1 / 1 point

c Data Science Elective Basket 20 Advanced Deep Learning Techniques - Assessment coursera.org/learn/fundamentals-of-deep-learning/assignment-submission/rMrDQ/advanced-deep-learning-techniques-assessment/view-feedback Due Mar 6, 11:59 PM IST

Advanced Deep Learning Techniques - Assessment  
Graded Assignment • 15 min

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".