COURSE OVERVIEW IT0034
Deep Learning Essentials - Neural Networks & Applications

Course Title
Deep Learning Essentials - Neural Networks & Applications

Course Date/Venue
Session 1: May 12-16, 2025/Glasshouse Meeting Room, Grand Millennium Al Wahda Hotel, Abu Dhabi, UAE
Session 2: September 07-11, 2025/Tamra Meeting Room, Al Bandar Rotana Creek, Dubai UAE

Course Reference
IT0034

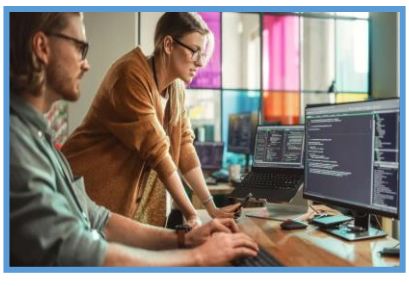
Course Duration/Credits
Five days/3.0 CEUs/30 PDHs

Course Description

This practical and highly-interactive course includes real-life case studies and exercises where participants will be engaged in a series of interactive small groups and class workshops.

This course is designed to provide participants with a detailed and up-to-date overview of Deep Learning Essentials - Neural Networks & Applications. It covers the machine learning and deep learning as well as their applications in healthcare, finance, autonomous systems and more; the concept of optimization in neural networks, backpropagation algorithm, chain rule and variants of gradient descent; the deep learning frameworks, overfitting, underfitting and regularization; the convolutional networks for image processing and CNN architectures covering LeNet-5, AlexNet, VGGNet and ResNet; and the CNN from Scratch, transfer learning, object detection with YOLO and faster R-CNN.

During this interactive course, participants will learn recurrent neural networks (RNNs), long short-term memory (LSTM) and gated recurrent units (GRU); the RNN for text generation, attention mechanisms and transformers; the preprocessing text for sentiment analysis, word embeddings, LSTM model for sentiment classification and evaluating model performance with precision and recall; the generative adversarial networks (GANs), autoencoders and variational autoencoders (VAEs) and deep reinforcement learning (DRL); the Q-learning and deep Q-networks (DQN), AI in gaming and robotics, model deployment and optimization; and the explainability, interpretability and advanced research trends in deep learning.



Course Objectives

Upon the successful completion of this course, each participant will be able to:-

- Apply and gain an in-depth knowledge on deep learning essentials
- Differentiate machine learning and deep learning and their applications in healthcare, finance, autonomous systems and more
- Discuss the concept of optimization in neural networks, backpropagation algorithm, chain rule and variants of gradient descent
- Interpret deep learning frameworks, overfitting, underfitting and regularization
- Describe convolutional networks for image processing and identify CNN architectures covering LeNet-5, AlexNet, VGGNet and ResNet
- Implement CNN from Scratch, discuss transfer learning and apply object detection with YOLO and faster R-CNN
- Discuss recurrent neural networks (RNNs), long short-term memory (LSTM) and gated recurrent units (GRU)
- Implement RNN for text generation and recognize attention mechanisms and transformers
- Apply preprocessing text for sentiment analysis, word embeddings, LSTM model for sentiment classification and evaluating model performance with precision and recall
- Identify generative adversarial networks (GANs), autoencoders and variational autoencoders (VAEs) and deep reinforcement learning (DRL)
- Explain Q-learning and deep Q-networks (DQN) and apply AI in gaming and robotics including model deployment and optimization
- Carryout explainability and interpretability in deep learning as well as advanced research trends in deep learning

Exclusive Smart Training Kit - H-STK®

*Participants of this course will receive the exclusive "Haward Smart Training Kit" (**H-STK®**). The **H-STK®** consists of a comprehensive set of technical content which includes **electronic version** of the course materials conveniently saved in a **Tablet PC**.*

Who Should Attend

This course provides an overview of all significant aspects and considerations of deep learning essentials for data scientists and machine learning engineers, AI and software engineers, data analysts and statisticians, IT and software developers, graduate students in AI and data science and business and industry professionals.

Course Fee

US$ 5,500 per Delegate + **VAT**. This rate includes H-STK® (Haward Smart Training Kit), buffet lunch, coffee/tea on arrival, morning & afternoon of each day.

Course Certificate(s)

Internationally recognized certificates will be issued to all participants of the course who completed a minimum of 80% of the total tuition hours.

Certificate Accreditations

Certificates are accredited by the following international accreditation organizations: -

- British Accreditation Council (BAC)

  Haward Technology is accredited by the **British Accreditation Council** for **Independent Further and Higher Education** as an **International Centre**. BAC is the British accrediting body responsible for setting standards within independent further and higher education sector in the UK and overseas. As a BAC-accredited international centre, Haward Technology meets all of the international higher education criteria and standards set by BAC.

- The International Accreditors for Continuing Education and Training (IACET - USA)

  Haward Technology is an Authorized Training Provider by the International Accreditors for Continuing Education and Training (IACET), 2201 Cooperative Way, Suite 600, Herndon, VA 20171, USA. In obtaining this authority, Haward Technology has demonstrated that it complies with the **ANSI/IACET 2018-1 Standard** which is widely recognized as the standard of good practice internationally. As a result of our Authorized Provider membership status, Haward Technology is authorized to offer IACET CEUs for its programs that qualify under the **ANSI/IACET 2018-1 Standard**.

  Haward Technology's courses meet the professional certification and continuing education requirements for participants seeking **Continuing Education Units** (CEUs) in accordance with the rules & regulations of the International Accreditors for Continuing Education & Training (IACET). IACET is an international authority that evaluates programs according to strict, research-based criteria and guidelines. The CEU is an internationally accepted uniform unit of measurement in qualified courses of continuing education.

  Haward Technology Middle East will award **3.0 CEUs** (Continuing Education Units) or **30 PDHs** (Professional Development Hours) for participants who completed the total tuition hours of this program. One CEU is equivalent to ten Professional Development Hours (PDHs) or ten contact hours of the participation in and completion of Haward Technology programs. A permanent record of a participant's involvement and awarding of CEU will be maintained by Haward Technology. Haward Technology will provide a copy of the participant's CEU and PDH Transcript of Records upon request.

Accommodation

Accommodation is not included in the course fees. However, any accommodation required can be arranged at the time of booking.

Course Instructor(s)

This course will be conducted by the following instructor(s). However, we have the right to change the course instructor(s) prior to the course date and inform participants accordingly:

Mr. Mohamed Radwan, PMP, CCNA, CCNP, CCSD, CCDA, Solaris, IBM, ITIL, NetApp, Symantec, MS, is a **Senior IT Engineer & Project Manager** with over **30 years** of teaching and industrial experience in **IT Performance** Management, **IT Performance** Success Factors, Critical Factors for **IT Performance**, **IT Metrics** Management, **IT Matrix & Protocols**, **IT Service Management**, **IT Continuity Management**, **Continuity Management Lifecycle**, **Continuity Plans** Development & Implementation, **IT Risk Assessment & Impact Analysis**, Effective **Crisis Management Structure**, **IT Networking & Project Management**. His main expertise covers **Network Security**, **Physical Security**, Effective **E-Communication & Collaboration Skills**, **Information Confidentiality**, **Data Confidentiality** Classification, IT **Risk Management** Concepts, IT **Project Management**, IT **Confidentiality**, **Security Protocols**, IT **Security Policies**, **Security Practices**, **Security Solutions**, IT **Network Security Administration**, IT **Service Management**, Telecom, Datacom & Network, **IP PBX/PABX**, IT **Management**, **IT** System, System Administration, **SIGMA** IT, **Microsoft**, Data Centre Analysis & Design, **CISCO**, **CCNA**, **CCNP**, **CCSP** & **CCDA**, **NetAPP**, **Netbackup**, **Symantec**, **SUN Storage**, **IBM Storage**, **SAN Switches**, **SUN Blades**, Tape Library, Data Storage & Protection, Platforms, **Data Base**, **Networking**, **Security Systems**, **Communication Equipments**, **Servers Cross-Platform Integration Technologies**, **Middleware**, **Switch & Routers** Installation & Design, **Backup Solution** Installation and **Network Infrastructure** & System Upgrade. Further, he is also well-versed in **ITIL Foundation**, Project Analysis, Project Management and Project Implementation. He is currently the **Regional Support & Services Manager** of the **STME** that provides the Middle East Regional information infrastructure solutions, and at the same time, he is the **Data Protection & Storage Consultant** for various international telecommunications companies.

During his career life, Mr. Mohamed has gained his technical and practical expertise through a variety of challenging and key positions such as the **Regional Support & Services Manager**, **Network/Security Consultant**, **Data Protection & Storage Consultant**, **Accounts Manager**, **Project Manager**, **Symantec Trainer & Administrator**, **Network Branch Manager**, **Technical Support Manager**, **Training Manager**, **Network & Computer Engineer**, **IT Specialist**, **Senior IT Instructor/Trainer** and **Lecturer** for various international companies such as the National Organization for Social Insurance (NOSI), USA Aid (ESED), Misr Computer Network & Co. and Informix System.

Mr. Mohamed has a **Bachelor's** degree in **Electronics & Communications Engineering**. Further, he is a **Certified Instructor/Trainer**, a **Certified Internal Verifier/Assessor/Trainer** by the **Institute of Leadership and Management** (**ILM**), a **Certified Systems Engineer & Systems Administrator** (**Security**, **Microsoft Office Specialist** and **Microsoft Certified IT Professional**), a **Certified CISCO Specialist**, an **Accredited NetApp Storage Architect Professional**, a **Certified NetApp Backup & Recovery Implementation Engineer**, a **Certified NetApp Data Management Administrator**, a **Certified NetApp SAN Implementation Engineer**, a **Certified Symantec Technical Specialist**, a **Solaris 10 Certified** and a **Certified IBM Specialist & Systems Expert**. Moreover, he is a member of **Project Management Institute** (**PMI**), a Chapter member of **MENA** and has delivered numerous trainings, conferences and workshops worldwide.

Training Methodology

All our Courses are including **Hands-on Practical Sessions** using equipment, State-of-the-Art Simulators, Drawings, Case Studies, Videos and Exercises. The courses include the following training methodologies as a percentage of the total tuition hours:-

30% Lectures
20% Practical Workshops & Work Presentations
30% Hands-on Practical Exercises & Case Studies
20% Simulators (Hardware & Software) & Videos

In an unlikely event, the course instructor may modify the above training methodology before or during the course for technical reasons.

Course Program

The following program is planned for this course. However, the course instructor(s) may modify this program before or during the course for technical reasons with no prior notice to participants. Nevertheless, the course objectives will always be met:

Day 1

0730 – 0800	*Registration & Coffee*
0800 – 0815	*Welcome & Introduction*
0815 – 0830	***PRE-TEST***
0830 – 0900	***Introduction to Deep Learning*** *Definition and Importance of Deep Learning • Differences Between Machine Learning and Deep Learning • Key Breakthroughs and Evolution of Deep Learning • Applications in Healthcare, Finance, Autonomous Systems, and More*
0930 – 0945	*Break*
0945 – 1030	***Basics of Artificial Neural Networks (ANN)*** *Structure of Neurons and Multi-Layer Perceptron (MLP) • Forward Propagation: How Information Flows • Activation Functions (ReLU, Sigmoid, Tanh, Softmax) • Loss Functions and Cost Optimization*
10030 – 1130	***Understanding Gradient Descent & Backpropagation*** *Concept of Optimization in Neural Networks • Role of Learning Rate and its Impact • Backpropagation Algorithm and Chain Rule • Variants of Gradient Descent (SGD, Mini-batch, Adam, RMSprop)*
1130 - 1230	***Deep Learning Frameworks (TensorFlow & PyTorch)*** *Overview of TensorFlow and PyTorch • Setting Up the Environment (Google Colab, Jupyter Notebooks) • Key Functions: Model Building, Training, and Evaluation • Hands-on: Implementing a Simple Neural Network*
1230 – 1245	*Break*

1245 – 1330	***Overfitting, Underfitting & Regularization*** *Understanding Overfitting versus Underfitting • Techniques to Reduce Overfitting (Dropout, L1/L2 Regularization) • Impact of Dataset Size on Model Performance • Hyperparameter Tuning for Better Generalization*
1330 - 1420	***Hands-on Project - Implementing a Basic Neural Network*** *Creating a Simple Neural Network with TensorFlow/Keras • Training on a Small Dataset (MNIST Digits Classification) • Evaluating Accuracy and Loss with Metrics • Fine-Tuning the Model for Improved Performance*
1420 – 1430	***Recap*** *Using this Course Overview, the Instructor(s) will Brief Participants about the Topics that were Discussed Today and Advise Them of the Topics to be Discussed Tomorrow*
1430	*Lunch & End of Day One*

Day 2

0730 – 0830	***Convolutional Neural Networks (CNNs)*** *Why Convolutional Networks for Image Processing? • Understanding Filters, Kernels and Convolution Operation • Pooling Layers (Max Pooling, Average Pooling) • CNN versus Fully Connected Networks*
0830 - 0930	***Deep Dive into CNN Architectures*** *LeNet-5 and AlexNet • VGGNet and ResNet: Skip Connections • Inception Networks and EfficientNet • Choosing the Right CNN Model for Applications*
0930 – 0945	*Break*
0945 – 1100	***Implementing CNN from Scratch*** *Building a CNN Model Using Keras • Training on CIFAR-10 Image Classification Dataset • Fine-Tuning with Data Augmentation • Evaluating Model Performance with Accuracy & Loss Graphs*
1100 - 1230	***Transfer Learning in CNNs*** *What is Transfer Learning and Why It's Useful? • Pre-trained Models (VGG16, ResNet, MobileNet) • Feature Extraction versus Fine-Tuning • Hands-on: Using a Pre-trained CNN for Custom Image Classification*
1230 – 1245	*Break*
1245 – 1330	***Object Detection with YOLO & Faster R-CNN*** *Understanding Object Detection versus Classification • YOLO (You Only Look Once) for Fast Object Recognition • Faster R-CNN for High-Accuracy Detection • Hands-on: Using YOLOv5 for Object Detection*
1330 - 1420	***Hands-On: Implementing CNN for Real-World Applications*** *Image Classification using ResNet • Object Detection using OpenCV and TensorFlow • Image Segmentation with U-Net • Evaluating and Deploying CNN Models*
1420 – 1430	***Recap*** *Using this Course Overview, the Instructor(s) will Brief Participants about the Topics that were Discussed Today and Advise Them of the Topics to be Discussed Tomorrow*
1430	*Lunch & End of Day Two*

Day 3

0730 – 0830	***Recurrent Neural Networks*** *How RNNs Handle Sequential Data • Difference Between Feedforward Networks and RNNs • Vanishing and Exploding Gradient Problems • Applications of RNNs in NLP, Time-Series Forecasting*
0830 - 0930	***Long Short-Term Memory (LSTM) & Gated Recurrent Units (GRU)*** *How LSTM Overcomes RNN's Limitations • Understanding LSTM Gates: Forget, Input and Output • Difference Between LSTM and GRU • Applications in Speech Recognition and Financial Forecasting*
0930 – 0945	*Break*
0945 – 1100	***Implementing an RNN for Text Generation*** *Tokenization and Text Preprocessing • Building an LSTM-Based Text Generator • Training the Model on Shakespeare's Text • Generating New Text with the Model*
1100 - 1230	***Attention Mechanisms & Transformers*** *Why Attention is Important in NLP Models • Self-Attention and Multi-Head Attention • Introduction to Transformers (BERT, GPT) • Applications in Chatbots and Language Translation*
1230 – 1245	*Break*
1245 – 1330	***Sentiment Analysis with Deep Learning*** *Preprocessing Text for Sentiment Analysis • Word Embeddings (Word2Vec, GloVe) • Training an LSTM Model for Sentiment Classification • Evaluating Model Performance with Precision and Recall*
1330 - 1420	***Hands-on: Implementing NLP Models*** *Training an RNN for Named Entity Recognition (NER) • Using BERT for Text Summarization • Implementing Speech-to-Text Using Deep Learning • Deploying an NLP Model for Real-World Applications*
1420 – 1430	***Recap*** *Using this Course Overview, the Instructor(s) will Brief Participants about the Topics that were Discussed Today and Advise Them of the Topics to be Discussed Tomorrow*
1430	*Lunch & End of Day Three*

Day 4

0730 – 0830	***Generative Adversarial Networks (GANs)*** *Understanding the Generator and Discriminator • Training a GAN Model: Challenges & Techniques • Applications of GANs (Deepfakes, Image Synthesis) • Hands-on: Generating Handwritten Digits Using GANs*
0830 - 0930	***Autoencoders & Variational Autoencoders (VAEs)*** *Understanding Autoencoders for Feature Learning • How VAEs Improve Over Autoencoders • Applications in Anomaly Detection • Hands-on: Implementing an Autoencoder for Image Denoising*
0930 – 0945	*Break*
0945 – 1100	***Deep Reinforcement Learning (DRL)*** *Basics of Reinforcement Learning (RL) • Role of Deep Learning in Reinforcement Learning • Policy Networks versus Value Networks • Applications in Robotics and Autonomous Vehicles*
1100 - 1230	***Q-Learning and Deep Q-Networks (DQN)*** *Understanding Q-Learning in RL • Implementing a Deep Q-Network (DQN) • Challenges in Training RL Agents • Hands-on: Training an AI Agent to Play Atari Games*
1230 – 1245	*Break*

1245 – 1330	***AI in Gaming & Robotics*** *How DeepMind's AlphaGo Used Deep Learning • Reinforcement Learning in Autonomous Driving • AI in Robotics and Human-Computer Interaction • Ethical Considerations in AI Development*
1330 - 1420	***Hands-on: Training RL Agents in OpenAI Gym*** *Introduction to OpenAI Gym • Training an RL Agent for CartPole Balancing • Implementing PPO for Reinforcement Learning • Deploying RL Models in Real-World Applications*
1420 – 1430	***Recap*** *Using this Course Overview, the Instructor(s) will Brief Participants about the Topics that were Discussed Today and Advise Them of the Topics to be Discussed Tomorrow*
1430	*Lunch & End of Day Four*

Day 5

0730 – 0830	***Model Deployment & Optimization*** *Exporting Deep Learning Models • Deploying on Flask/Django REST API • Using TensorFlow Serving for Scalable Deployment • Deploying Models on Edge Devices*
0830 – 0930	***Explainability & Interpretability in Deep Learning*** *Why Model Interpretability Matters? • SHAP and LIME for Explainable AI • Bias and Fairness in AI • Ethical AI Development Guidelines*
0930 – 0945	*Break*
0945 – 1100	***Real-World Case Studies in Deep Learning*** *AI in Healthcare: Diagnosing Diseases with CNNs • AI in Finance: Fraud Detection with LSTMs • AI in Retail: Personalized Recommendations with Deep Learning • AI in Cybersecurity: Anomaly Detection*
1100 - 1230	***Advanced Research Trends in Deep Learning*** *Meta-Learning and Few-Shot Learning • Self-Supervised and Semi-Supervised Learning • Quantum Deep Learning • Future of AGI (Artificial General Intelligence)*
1230 - 1245	*Break*
1245 - 1345	***Final Project & Review*** *Building an End-to-End Deep Learning Model • Fine-Tuning, Training and Optimization • Model Deployment on Cloud Platforms*
1345 – 1400	***Course Conclusion*** *Using this Course Overview, the Instructor(s) will Brief Participants about the Course Topics that were Covered During the Course*
1400 – 1415	***POST-TEST***
1415 – 1430	*Presentation of Course Certificates*
1430	*Lunch & End of Course*

Practical Sessions

This practical and highly-interactive course includes real-life case studies and exercises:-

Course Coordinator

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