COURSE OVERVIEW IT0007
Tensorflow & Keras

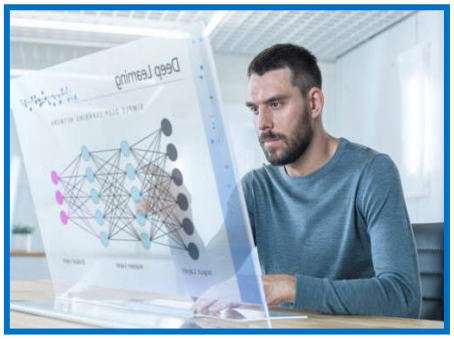
Course Title
Tensorflow & Keras

Course Date/Venue
Session 1: April 21-25, 2025/Glasshouse Meeting Room, Grand Millennium Al Wahda Hotel, Abu Dhabi, UAE
Session 2: December 21-25, 2025/Tamra Meeting Room, Al Bandar Rotana Creek, Dubai UAE

Course Reference
IT0007

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

Course Objectives



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 Tensorflow & Keras. It covers the deep learning and setting up TensorFlow and Keras environment; the basics of tensors and tensor operations and building neural network with Keras API; the data handling in TensorFlow and TensorBoard for model visualization; the backpropagation and gradient descent and customizing training with callbacks; handling overfitting and underfitting; the model evaluation and hyperparameter tuning; and using pretrained models for transfer learning.

Further, the course will also discuss the performance with distributed training, convolutional neural networks (CNNs) and building a CNN from scratch using Keras; the image augmentation and data preprocessing, transfer learning with CNNs and object detection and segmentation in TensorFlow; deploying CNN models for real-world applications, recurrent neural networks (RNNs) and building RNNs with Keras; and the word embeddings, text representation, sentiment analysis and text classification.

During this interactive course, participants will learn the transformer models in TensorFlow and chatbots with TensorFlow; the generative adversarial networks (GANs), autoencoders for anomaly detection and reinforcement learning with TensorFlow; converting models to TensorFlow Lite (TFLite) and deploying models using TensorFlow.js; the TensorFlow serving and using Docker and Kubernetes for AI applications; using TensorFlow on Google Cloud; and deploying models with AWS SageMaker.

Course Objectives

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

- Apply and gain a comprehensive knowledge on Tensorflow and Keras
- Discuss deep learning and TensorFlow and set-up TensorFlow and Keras environment
- Explain the basics of tensors and tensor operations and build neural network with Keras API
- Apply data handling in TensorFlow and TensorBoard for model visualization
- Recognize backpropagation and gradient descent and customize training with callbacks
- Handle overfitting and underfitting, illustrate model evaluation and hyperparameter tuning and use pretrained models for transfer learning
- Optimize performance with distributed training, discuss convolutional neural networks (CNNs) and build a CNN from scratch using Keras
- Illustrate image augmentation and data preprocessing, transfer learning with CNNs and object detection and segmentation in TensorFlow
- Deploy CNN models for real-world applications and discuss recurrent neural networks (RNNs)
- Build RNNs with Keras and apply word embeddings, text representation, sentiment analysis and text classification
- Illustrate transformer models in TensorFlow and implement chatbots with TensorFlow
- Discuss generative adversarial networks (GANs), autoencoders for anomaly detection and reinforcement learning with TensorFlow
- Convert models to TensorFlow Lite (TFLite) and deploy models using TensorFlow.js
- Serve models with TensorFlow Serving and use Docker and Kubernetes for AI applications
- Use TensorFlow on Google Cloud and Deploy models with AWS SageMaker

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 Tensorflow and Keras for IT support, data scientists, machine learning engineers, software engineers/developer, AI/ML researchers, business analysts and data analysts, product managers, linguists and other technical staff.

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.

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:

Dr. Abedallah Al-Oqaili, PhD, MSc, is a **Senior IT Engineer** with over **30 years** of teaching and industrial experience in the areas of **MS Excel**, **MS WinWord**, **MS PowerPoint**, **ERP SAP 6.0**, **Artificial Intelligence & Neural Network**, **Cyber Ethical Hacking**, **Windows Operating System**, **Windows Server** Administration, **Python** Programming, **MS Office 365 BI**, **Digital Strategy & Transformation**, **Data Base** Design, **Computer** Maintenance, System Analysis & Design, **SQL Programming**, Decision Support Systems & Business Intelligence, **SQL**, **PL/SQL**, **C**, **C++**, **Java**, **Computer** Applications, **Scripting Languages**, VB, VB.Net, **Simulation & Modelling**, Management Information Systems, **E-commerce**, **Oracle** HRMS, **Oracle** Forms & Reports, **Oracle PL/SQL**, Problem Solving Technique, **Oracle ERP**, **ERP** Customized Oracle Application, Organization & System Process, User Acceptance Testing (**UAT**), Core HR, Payroll, SSHR, OLM, IRec, Medical, RTA & Provident Fund, **Oracle Developer/2000**, **Oracle 7.3 & Oracle 8i System**, **Oracle & FoxPro** for Windows, **DBASE III+**, Clipper, **FoxPro 2.1**, **JDeveloper**: Building Applications with ADF, **Oracle Developer**, Oracle WebDB, **J2EE** (Java 2 Enterprise Edition), **Java** Programming, **Oracle** Payroll Fast Formula, Oracle: Internet Application I, **Oracle** 8i DBA, **Oracle** 8i Forms 1&2, **Oracle** 8i Report, **Oracle** Application Server Rel. 4.0, **Oracle** DBA, Building Web Sites on the Internet, Visual Basic 5, **Oracle7 SQL**, **Oracle** Reports V2.5, **Oracle** Forms V4.5/V5.0/V6.0/V6i, **Oracle** Server Administrations, Software Systems Analysis & Design, General Orientation Course at ATOS, **Application** Engineering (PC Based System Design & Development), Novell 3.11, Novell NetWare, Lotus 123, Excel and Word Processing. Further, he is also well-versed in Project Management, Project Analysis, Design and Development for Mail Revenue & Handling System, Leadership Training, Manager Skills, Supervisory Skills, Microsoft Project, Advanced Excel, Instructional Techniques, Oracle Mobile Development Framework and Technical Writing.

During his career life, Dr. Abedallah has gained his technical and practical expertise through a variety of challenging and key positions such as the IT **Senior Manager**, **IT Manager**, **IT Project Manager**, **IT Trainer**, **Management Information System Faculty Head**, **Computer Science College Professor**, **Computer** and **Business Networking Department Trainer**, **IT Superintendent**, **IT Software Supervisor**, **IT System Analyst** and **IT Programmer** for various international companies such as the PAAET Basic Education College, Philadelphia University, Royal Jordan Airlines and Abu Al-Haj Training Center.

Dr. Abedallah has a **PhD** in **Computer Information Systems** and a **Master's** degree in **Information System** from the **University** of **Banking** and **Financial Sciences**, **Computer Information Systems**. 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**) 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 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.

Accommodation

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

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 – 0930	***Introduction to Deep Learning & TensorFlow*** *Overview of AI, Machine Learning & Deep Learning • Why TensorFlow? History & Evolution • TensorFlow versus PyTorch: Key Differences • Understanding Key Deep Learning Concepts*
0930 – 0945	*Break*
0945 – 1030	***Setting Up TensorFlow & Keras Environment*** *Installing TensorFlow & Keras (Pip, Anaconda, GPU Version) • Understanding Google Colab & Jupyter Notebook • Configuring GPU Acceleration for TensorFlow • Checking TensorFlow Version & Dependencies*
1030 – 1130	***Basics of Tensors & Tensor Operations*** *What are Tensors? Differences from NumPy Arrays • Creating & Manipulating Tensors • TensorFlow Operations (Addition, Multiplication, Reshape, Transpose) • Broadcasting & Automatic Differentiation*
1130 – 1215	***Building a Neural Network with Keras API*** *What is Keras? Why Use it? • Creating a Simple Feedforward Neural Network • Understanding Sequential versus Functional API • Compiling, Training & Evaluating a Model*

1215 – 1230	*Break*
1230 – 1330	***Data Handling in TensorFlow (TF.data API)*** *Loading Datasets (CSV, Images, Text) • Creating TensorFlow Datasets from NumPy arrays • Data Pipeline Optimization for Large Datasets • Batching, Shuffling & Prefetching*
1330 – 1420	***TensorBoard for Model Visualization*** *Introduction to TensorBoard • Visualizing Metrics (Accuracy, Loss) • Tracking Model Performance • Comparing Models using TensorBoard*
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	***Understanding Backpropagation & Gradient Descent*** *How Neural Networks Learn • The Role of Gradients in Optimization • Different Types of Gradient Descent (SGD, Adam, RMSprop) • Impact of Learning Rate on Convergence*
0830 – 0930	***Customizing Training with Callbacks*** *What are Callbacks? Why Use them? • Early Stopping to Prevent Overfitting • ModelCheckpoint for Saving Best Models • Custom Callback Implementation*
0930 – 0945	*Break*
0945 – 1100	***Handling Overfitting & Underfitting*** *Identifying Overfitting in Deep Learning Models • L1 & L2 Regularization • Dropout & Batch Normalization • Data Augmentation Techniques*
1100 – 1215	***Model Evaluation & Hyperparameter Tuning*** *Evaluating Models with Accuracy, Loss, Confusion Matrix • Hyperparameter Tuning Using GridSearchCV & RandomSearch • Using Keras Tuner for Automated Tuning • Cross-Validation Techniques*
1215 – 1230	*Break*
1230 – 1330	***Using Pretrained Models for Transfer Learning*** *Introduction to Transfer Learning • Using Models Like VGG16, ResNet, Inception • Fine-Tuning a Pretrained Model • Implementing Feature Extraction*
1330 – 1420	***Optimizing Performance with Distributed Training*** *Multi-GPU training with TensorFlow • TensorFlow Mirrored Strategy • TPU Training for Large-Scale Models • Asynchronous Training Strategies*
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	***Convolutional Neural Networks (CNNs)*** *Why CNNs for Image Processing? • Components of a CNN (Convolution, Pooling, Fully Connected layers) • Activation Functions used in CNNs • Popular CNN Architectures (AlexNet, VGG, ResNet)*
0830 – 0930	***Building a CNN from Scratch using Keras*** *Creating Convolutional Layers in Keras • Pooling Layers for Dimensionality Reduction • Adding Dropout to Prevent Overfitting • Compiling & Training a CNN Model*
0930 – 0945	*Break*
0945 – 1100	***Image Augmentation & Data Preprocessing*** *Why Data Augmentation is Important • Keras ImageDataGenerator for Augmentation • Image Normalization Techniques • Handling Imbalanced Image Datasets*
1100 – 1215	***Transfer Learning with CNNs*** *Using Pretrained Models from Keras • Feature Extraction versus Fine-Tuning • Implementing VGG16, ResNet & MobileNet • Customizing & Adapting Pretrained Models*
1215 – 1230	*Break*
1230 – 1330	***Object Detection & Segmentation in TensorFlow*** *Understanding Object Detection & Segmentation • Using TensorFlow Object Detection API • Implementing YOLO & Faster R-CNN Models • Image Segmentation using U-Net*
1330 – 1420	***Deploying CNN Models for Real-World Applications*** *Converting Models to TensorFlow Lite (TFLite) • Deploying CNN Models on Mobile & Edge Devices • Using TensorFlow Serving for Cloud Deployment • Integrating CNN Models with Web 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	***Recurrent Neural Networks (RNNs) & Sequential Data Processing*** *Why RNNs for Sequential Data? • Understanding Time-Series & Text Data • Types of RNNs (Simple RNN, LSTM, GRU) • Applications of RNNs in Natural Language Processing (NLP) & Finance*
0830 – 0930	***Building RNNs with Keras*** *Creating Simple RNNs in Keras • Adding LSTM & GRU Layers • Handling Variable-Length Sequences • Implementing Attention Mechanisms*
0930 – 0945	*Break*
0945 – 1100	***Word Embeddings & Text Representation*** *Word Embeddings versus One-Hot Encoding • Using Word2Vec, GloVe & FastText • Implementing Embeddings in Keras • Visualizing Embeddings with TensorBoard*
1100 – 1215	***Sentiment Analysis & Text Classification*** *Tokenization & Text Preprocessing • Training LSTMs for Sentiment Analysis • Using BERT for Text Classification • Deploying Text Models in Real-World Applications*

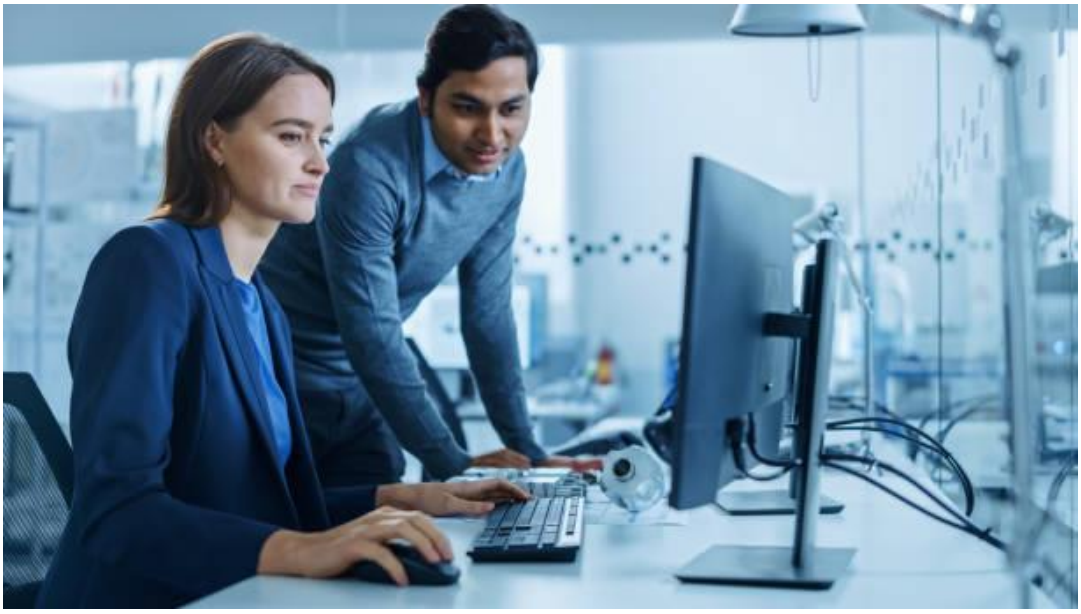
1215 – 1230	Break
1230 – 1330	***Transformer Models in TensorFlow*** *Introduction to Transformers & Self-Attention • BERT versus GPT: Key Differences • Using Hugging Face Transformers in TensorFlow • Training Custom Transformer Models*
1330 – 1420	***Implementing Chatbots with TensorFlow*** *Understanding Chatbot Architecture • Using RNNs & LSTMs for Chatbots • Implementing Seq2seq Models • Deploying Chatbot Models with TensorFlow Serving*
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	***Generative Adversarial Networks (GANs)*** *Understanding GANs & their Architecture • Implementing a Simple GAN in TensorFlow • Training GANs for Image Generation • Applications of GANs in Deep Learning*
0830 – 0930	***Autoencoders for Anomaly Detection*** *Introduction to Autoencoders • Variational Autoencoders (VAE) • Using Autoencoders for Data Compression • Anomaly Detection with TensorFlow*
0930 – 0945	*Break*
0945 – 1030	***Reinforcement Learning with TensorFlow*** *Basics of Reinforcement Learning • Implementing Deep Q-Networks (DQN) • Training an Agent using OpenAI Gym • Real-World Applications of RL*
1030 – 1130	***Model Deployment & Serving*** *Converting Models to TensorFlow Lite (TFLite) • Deploying Models using TensorFlow.js • Serving Models with TensorFlow Serving • Using Docker & Kubernetes for AI Applications*
1130 – 1215	***Cloud-Based Deep Learning with TensorFlow*** *Using TensorFlow on Google Cloud • Training Models with TPUs on Google Colab • Deploying Models with AWS SageMaker • TensorFlow Extended (TFX) for Production Pipelines*
1215 – 1230	*Break*
1230 – 1345	***Final Project: End-to-End Deep Learning Model*** *Choosing a Real-World Project • Data Preprocessing & Augmentation • Training & Optimizing the Model • Deploying the Model as an API*
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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