Government of Pakistan

National Vocational and Technical Training Commission

(NAVTTC)

"Prime Minister Youth Skill Development Program"

Course Contents / Lesson Plan
Course Title: Huawei HCCDA-AI
Duration: 3 Months

Author Name	**Cyber Vision/Huawei**
Course Title	**Huawei HCCDA - AI**
Training Objective & Outcomes	Prepare candidates for the **Huawei HCCDA-AI certification** by covering AI/ML fundamentals, Huawei Cloud AI services, ModelArts, deep learning frameworks, and real-world AI application development.
Entry-level of trainees	Currently enrolled in at least the 7th semester of a bachelor's degree program (i.e., completed 6 semesters with a transcript) OR Pursuing a graduate/postgraduate degree in a relevant field such as: • Information Technology (IT) • Computer Science • Mechatronics • Electrical or Electronics Engineering • Computer Systems Engineering Candidates who have completed a Diploma in Information Technology (DIT) and have relevant field experience such as internships, freelance work, or professional roles in IT, networking, or technical support are eligible for this program.
Minimum Qualification of Teachers	• **Minimum Qualification:** Master's degree (16 years of education) in Computer Science, Information Technology, Software Engineering, Artificial Intelligence, or a closely related discipline from a recognized institution. • **Certification Requirement**: Must be Huawei Certified — preferably HCCDA-AI (Huawei Certified ICT Associate – Artificial Intelligence) or higher. Equivalent certifications in AI. • **Professional Experience:** Minimum of 2 years of hands-on industry experience in AI or closely related domains such as machine learning, data science, Cloud-AI integration, or intelligent computing. • Proven ability to design and deliver technical training, conduct assessments, and mentor learners • Experience with project-based learning and supporting trainees in real-world AI applications

Scheme of Studies

Huawei HCCDA-AI
(3-Month Course)

Sr. No	Main Topics	Theory Hrs.	Practical Hrs.	Total Hrs.	Credit Hours
1.	Foundations of AI and Machine Learning	15	0	15	**1.5**
2.	Data Science Essentials for AI Development	05	10	15	**1**
3.	Python Programming for AI and Cloud Developers	05	10	15	**1**
4.	Cloud Fundamentals for AI Applications	05	10	15	**1**
5.	AI Application Requirement Analysis and Design	04	11	15	**0.95**
6.	Huawei Cloud EI Services & AI APIs	04	11	15	**0.95**
7.	Hands-on: Using AI APIs (OCR, NLP, Vision)	03	12	15	**0.9**
8.	Introduction to Huawei ModelArts and AutoML	13	2	15	**1.4**
9.	Edge AI and Huawei HiLens Service	5	10	15	**1**
10.	AI Model Testing, Evaluation, and Optimization	6	9	15	**1.05**
11.	Huawei HCCDA-AI Official Training and Exam Review	4	11	15	**0.95**
12.	Capstone Project and Certification Readiness	5	10	15	**1**
Total		**74**	**106**	**180**	**13**

Course Execution Plan

Duration of the course: **3 months (12 Weeks)**
Theory: **41%**
Practical: **59%**

	Weekly hours: **15 hours per week** Total contact hours: **Maximum 180 hours**
Companies offering jobs in the respective trade	• Huawei • Pakistan Telecommunication Authority (PTA) • Telenor/Jazz/Ufone/Banking Industry • National Database and Registration Authority (NADRA) • SAP Pakistan • Accenture Pakistan • Devsinc • ActiveKey Solutions • Fusemachines • Sapphire Consulting Services • Askari General Insurance Company Limited • Beyond Eris Solutions • LN Technologies • Central Training Academy • Peak Solutions • Motive • Azure/AWS • Askari General Insurance Company • Nicon Group of Colleges • 9D Technologies • MTBC • Zeki Expert Solutions • Crossover • Toptal/ Upwork/ Turing/ Fiverr
No of Students	25 - 35
Learning Place	Classroom / Lab
Instructional Resources	• Huawei HCCDA-AI Official Page • ModelArts – AI development & deployment • MindSpore / TensorFlow – Deep learning frameworks • Python (Jupyter/Colab) – Core programming • Huawei Cloud – For cloud-AI integration labs

DETAIL OF COURSE CONTENTS

Module Title	Learning Units	Task/Practical
Introduction to AI & Huawei Strategy	**Day 1** **What is AI? History, types, and scope of AI**	• Define AI and distinguish between weak, strong, and general AI • Explore historical evolution of AI • Discuss symbolic vs. machine learning AI • Identify key domains (vision, NLP, robotics)
	Day 2 **AI industry ecosystem, trends, and challenges in adoption**	• Present global AI industry landscape (companies, sectors) • Identify AI trends (e.g., GenAI, edge AI, LLMs) • Discuss adoption barriers (data, regulation, cost) • Use a Gartner Hype Cycle visual
	Day 3 **Huawei's AI strategy & open AI capabilities from Huawei Cloud EI**	• Introduce Huawei Cloud EI portfolio (vision, NLP, speech, OCR) • Discuss ModelArts, HiLens integration • Showcase Huawei's global AI initiatives • Map use cases to Huawei capabilities
	Day 4 **Overview of AI certification exam: domains, sample questions, and preparation tips**	• Review exam format and weightage by domain • Analyze sample questions and answer structure • Discuss learning strategy and revision plan • Take a short pre-test (10–12 questions)
	Day 5 **Quiz + group discussion on AI trends & Huawei strategy**	• Conduct a formal quiz on Weeks 1 content • Review each answer with rationales • Group debate: AI hype vs reality • Trainer Q&A on career scope in AI
Python for AI (ModelArts tools)	**Day 6** **Python basics review: variables, loops, functions**	• Setup Python 3 environment on ModelArts • Review variables, data types, and conditionals • Practice writing functions and loops • Implement simple logic-based examples
	Day 7 **NumPy arrays: creation, operations,**	• Import NumPy and create arrays from lists

	broadcasting	• Apply indexing, slicing, reshaping • Demonstrate broadcasting and matrix multiplication • Solve numerical problems with NumPy
	Day 8 **Pandas for data manipulation + Scikit-learn basics**	• Load datasets with Pandas (CSV/Excel) • Explore dataframes: filtering, grouping, missing values • Train a basic classifier with scikit-learn • Evaluate accuracy with simple metrics
	Day 9 **Using ModelArts notebooks: environment setup, code, data access**	• Launch a notebook on Huawei ModelArts • Upload and organize datasets on OBS • Mount OBS to the notebook environment • Run a test script using built-in tools
	Day 10 **Practical: manipulate data using NumPy and Pandas in ModelArts**	• Import real dataset (e.g., Titanic, Iris) • Clean and transform data with Pandas • Perform statistical analysis using NumPy • Visualize outputs using Matplotlib or Seaborn
Huawei Cloud EI API Services	**Day 11** **EI overview: image, NLP, OCR, and speech services overview**	• Introduce Huawei EI platform and service categories • Explain key services: image tagging, speech-to-text, sentiment analysis, OCR • Identify application scenarios for each service • Review sample output and architecture diagrams
	Day 12 **Authentication and API calling methods: REST, SDKs (Python)**	• Set up Huawei Cloud account and create access keys • Install SDK and configure credentials securely • Practice REST calls using Postman and Python requests • Explore rate limits, auth headers, and status codes
	Day 13 **Deep dive into General Table OCR API**	• Explain use cases for table OCR (invoices, reports, receipts) • Understand API parameters and response structure

		• Use API docs to build request body • Review output JSON and extract cell values
	Day 14 **Practical: Call and test General Table OCR API**	• Upload a test table image to OBS • Write Python script to invoke OCR API with image link • Parse response and visualize the extracted data • Handle common errors (timeout, image type)
	Day 15 **Practical: Evaluate and log API results**	• Create multiple test cases with varied tables • Log response time and accuracy for each • Compare results with ground truth data • Generate a simple evaluation report (precision/recall summary)
Requirement Analysis for AI Integration	**Day 16** **Requirement analysis: techniques and templates**	• Discuss the role of requirement analysis in AI integration projects • Review requirement elicitation techniques (interviews, observations) Explore templates for functional and data requirements • Analyze a sample AI project requirement document
	Day 17 **Functional & non-functional requirements**	• Define functional requirements for AI systems (input, output, workflow) • Identify non-functional requirements (performance, scalability, ethics) • Use checklist to validate completeness • Group exercise: extract F/NF requirements from a case
	Day 18 **Drafting a complete requirement spec for AI projects**	• Choose a sample AI application (e.g., document classifier, object detector) • Identify stakeholders and user goals • Draft full spec: problem, scope, inputs, expected outputs • Peer review for completeness and clarity
	Day 19 **Mapping requirements to Huawei AI tools**	• Map functional goals to Huawei Cloud services • Choose APIs/models aligned to

	(EI, ModelArts, HiLens)	use case • Determine whether edge, cloud or hybrid is best • Finalize tech stack and architecture sketch
	Day 20 **Assignment: Create a requirement document for a retail analytics system**	• Define use case (e.g., customer traffic analysis, shelf monitoring) • Document all functional/NF requirements • Map out service architecture using Huawei Cloud • Submit and present summary to peer group
Huawei Cloud ModelArts Introduction	**Day 21** **What is ModelArts: features and UI walk-through**	• Introduce ModelArts platform and its role in AI lifecycle • Explore UI: datasets, training, deployment tabs • Review service architecture and pricing tiers • Navigate built-in tools: notebook, AutoML, pipelines
	Day 22 **Using pre-trained foundation models (vision, NLP)**	• Locate and explore ModelArts pre-trained models • Run image classification and sentiment analysis demos • Examine input/output formats and APIs • Customize inputs and compare predictions
	Day 23 **Model training lifecycle: datasets, labeling, evaluation**	• Create dataset: upload or link from OBS • Label dataset manually or via Auto-labeling • Train a model with sample configuration • Evaluate results and download metrics
	Day 24 **AutoML and experiment management in ModelArts**	• Use AutoML to build model from tabular/image data • Compare multiple runs in experiment manager • View loss curves and adjust settings • ave and export best model
	Day 25 **Practical: Fine-tune a pre-trained sentiment model on a custom dataset**	• Select a text-based pre-trained NLP model • Prepare and upload labeled custom reviews • Fine-tune using ModelArts AutoML or training job

		• Evaluate with accuracy/f1 and download model
HiLens Architecture & Use Cases	**Day 26** **HiLens overview: hardware + architecture**	• Explain HiLens edge AI use cases (retail, surveillance, logistics) • Describe device architecture and deployment scenarios • Review Huawei HiLens Kit specs and supported models • Discuss edge vs cloud inference
	Day 27 **Features of HiLens: edge AI, video analytics, event handling**	• Walk through event-driven architecture in HiLens • Explore supported video and image formats • Understand stream processing and scheduling • View real-time camera analytics demo
	Day 28 **HiLens SDK and deployment pipeline overview**	• Set up the HiLens development environment (SDK install, device link) • Build and package a simple model • Deploy model using HiLens pipeline builder • Monitor status and debug device
	Day 29 **Practical: Deploy pre-built model to HiLens device**	• Choose a vision model (face detection, object tracking) • Deploy to HiLens and stream test input • Observe inference logs on device and cloud • Record results and validate detection accuracy.
	Day 30 **Practical: Create simple event-triggered inference application**	• Define a business logic event (e.g., “detect person” = send alert) • Write inference + action logic in SDK • Upload, test, and validate real-time event output • Document edge inference lifecycle
Deep Learning Concepts & Frameworks	**Day 31** **Neural networks: perceptrons, activation functions, layers**	• Introduce basic building blocks: neurons and layers • Visualize forward propagation and loss • Discuss activation functions (ReLU, Sigmoid, Softmax) • Implement a basic neural net in pseudo-code
	Day 32	• Explain CNN architecture for

	CNNs and RNNs explained with visual demos	image tasks (filters, pooling) • Walk through RNNs for sequential data • Show visual demo of feature extraction and prediction • Compare CNN vs RNN use cases.
	Day 33 **TensorFlow vs. PyTorch in ModelArts**	• Compare frameworks in terms of syntax, abstraction, flexibility • Run a simple image classifier using both frameworks in notebooks • Discuss when to choose one over the other • Examine integration support in ModelArts
	Day 34 **Building a CNN with TensorFlow for image classification**	• Load and preprocess image dataset (e.g., Fashion MNIST) • Define CNN architecture using Keras (TensorFlow) • Train and validate model • Plot metrics and review misclassifications
	Day 35 **Practical: Train & test food classification model using ExeML**	• Upload food image dataset to ModelArts • Use ExeML to auto-train image classifier • Monitor training progress and view performance graphs • Test on new images and download inference results
Model Deployment & Integration	**Day 36** **ModelArts deployment methods: real-time vs. batch**	• Explain difference between real-time and batch inference • Walk through deployment types in ModelArts • Select appropriate deployment for use case • Explore latency vs throughput trade-offs
	Day 37 **API endpoints, SDKs, and integration best practices**	• Expose deployed model as API endpoint • Use Python SDK to authenticate and send input • Parse output and handle errors • Review common security and versioning practices
	Day 38 **Practical: Deploy and call a model endpoint from a Python script**	• Write a Python client to send request to deployed API • Format input based on model type (text/image) • Print and log model predictions

		• Test with multiple inputs and handle exceptions
	Day 39 **Case Study: Goods Recognition in shopping malls**	• Review case architecture: camera + HiLens + ModelArts API • Analyze model logic for object detection & tagging • Walk through edge-cloud inference chain • Explore data flow and latency implications.
	Day 40 **Practical: Build and test retail goods recognition app**	• Simulate a product recognition app using image uploads • Trigger inference through API • Display recognized goods and confidence scores • Store results for analytics (optional DB or CSV)
Testing & Optimization for AI Apps	**Day 41** **Testing methods: unit, integration, system testing in AI**	• Introduce testing layers in AI pipelines • Design unit tests for pre/postprocessing functions • Discuss integration tests across API/data flow • Identify system testing checkpoints for full pipeline
	Day 42 **Role of testing in model iteration and optimization**	• Define model performance testing (accuracy, latency) • Explore dataset versioning and re-training triggers • Create A/B test plans for two models • Discuss how testing informs tuning
	Day 43 **Performance benchmarking and error analysis**	• Collect prediction logs and latency data • Use confusion matrix for classification error analysis • Identify false positives/negatives and root causes • Adjust threshold or retrain with targeted samples
	Day 44 **IoT Device Integration with Edge AI** **Practical: Write test cases for OCR and classification APIs**	• Define test inputs and expected results for OCR • Run classification API on noisy data • Validate output format and correctness • Document edge cases and inconsistencies
	Day 45	• Review logs for latency spikes or

	Practical: Analyze test logs and suggest model improvements	failed calls • Correlate performance issues with input variations • Recommend dataset refinements or model architecture changes • Prepare a testing summary report
MLOps & CI/CD on Huawei Cloud	**Day 46** **Introduction to MLOps & pipeline orchestration**	• Define MLOps lifecycle stages: data, model, code, deployment • Identify tools used in Huawei Cloud for orchestration • Map traditional DevOps to AI workflows • Review examples of automated pipelines
	Day 47 **CI/CD integration using ModelArts + OBS + FunctionGraph**	• Configure OBS bucket for model/data storage • Set up ModelArts pipeline triggered by data arrival • Use FunctionGraph to automate post-inference task (e.g., notification) • Run CI/CD loop and monitor
	Day 48 **Monitoring & model drift detection**	• Explain model drift (concept and data) • Configure CloudEye for monitoring inference performance • Set thresholds for retraining based on accuracy drop • Log input distributions for comparison
	Day 49 **Practical: Build a simple data drift-triggered retraining pipeline**	• Simulate drift with changed dataset • Detect drop in model performance • Trigger training pipeline via event • Deploy updated model and compare before/after metrics
	Day 50 **Group discussion: MLOps challenges and solutions**	• Present real-world MLOps pain points (e.g., data lag, brittle models) • Discuss reproducibility and traceability • Compare open-source vs Huawei pipeline tools • Share group recommendations and summaries
Exam Prep & Certification	**Day 51** **Full-length mock exam 1 + Review**	• Attempt 60-minute mock exam simulating real conditions • Score and record performance by

Focus		domain • Review difficult questions in group • Trainer explains key mistakes and strategies
	Day 52 **Domain-wise question practice: APIs, ModelArts, HiLens**	• Solve 5–10 questions per domain (with reasoning) • Group discussion: compare thought processes • Focus on OCR, ModelArts UI, API endpoints • Recap of certification syllabus
	Day 53 **Mock exam 2 + Discussion**	• Take a second 60-min mock with new questions • Score and self-assess improvement vs Day 51 • Debrief: what to revise in remaining time • Share individual strategy plans
	Day 54 **Final tips, time management, and last-minute revision**	• Prioritize key topics (e.g., deployment, API integration) • Practice time-boxing and flagging strategy • Use flashcards / cheat sheet for memorization • Q&A session for final clarifications
	Day 55 **Group Q&A session, problem-solving clinic**	• Raise personal doubts from any week/module • Solve peer-posted practical or theoretical cases • Trainer reviews mock stats and offers guidance • Calm nerves: talk exam-day logistics and mindset
Capstone Project Development & Review	**Day 56** **Project kickoff: choose a domain (e.g., chatbot, smart retail, inspection)**	• Review sample project ideas and constraints • Define objectives, data needs, and success criteria • Allocate teams or solo roles • Draft system architecture
	Day 57 **Build project: Data ingestion, training, API deployment**	• Collect or upload training dataset • Train initial model using ModelArts or ExeML • Deploy as API or HiLens stream • Begin writing inference client app
	Day 58 **Build project: Testing and presentation draft**	• Write unit and integration test cases • Evaluate performance metrics and make improvements

		• Finalize visual presentation: code + results • Conduct dry-run with peer feedback
	Day 59 **Capstone project presentations + code demo**	• Present architecture, training pipeline, results • Demo model in action (API call or HiLens test) • Answer Q&A from peers and instructors • Submit all artifacts (slides, code, logs)
	Day 60 **Feedback, certification registration support, closing & celebration**	• Receive feedback and scores from instructors • Share success stories and lessons learned • Complete official exam registration (if not done) • Certificate distribution + closing remarks

LIST OF MACHINERY / EQUIPMENT

For the Class of 35 Students (3-Month Course)

S. No	Name of Items	Quantity/Unit
1.	Intel i5/i7, 8 GB Ram, 250 GB SSD	35
2.	High-Speed Internet Min 25MB	1
3.	Monitors (24-inch FHD/IPS)	2
4.	Backup Power Supply (UPS)	1
5.	Projector / Smart Display	1
6.	Microphone & Speaker System	1

LIST OF CONSUMABLE MATERIAL

For the Class of 25 Students (3-Month Course)

S. No	Name of Items	Unit
1.	Writing Notebooks	30
2.	Pens (Blue/Black)	60
3.	Markers (Whiteboard)	10
4.	Whiteboard Dusters	2
5.	Printing Paper (A4)	5 Rims
6.	File Folders	30