ELEVORIX
ACADEMY

Computer Vision Systems Engineering

DIPLOMA

Python -> ML -> Deep Learning -> Deployment -> Computer Vision -> Capstone

22 Weeks • ~110 Hours • 2 Live Sessions / Week • Interview-Ready CV System

Program Overview

22	~110h	6	44
Weeks	Live Instruction	Phases	Sessions

What You'll Build

- ✓ Interview-ready video analytics CV system
- ✓ Object detection + tracking pipeline with mAP
- ✓ Segmentation project with mIoU/Dice metrics
- ✓ Dockerized vision API + Streamlit demo UI
- ✓ GitHub portfolio with README, demo & metrics

Format & Delivery

- ✓ Session A: 3h guided practical each week
- ✓ Session B: 2h guided practical each week
- ✓ Live Hybrid (online + offline)
- ✓ English delivery + Arabic support
- ✓ Interview-ready portfolio on completion

Program Architecture — 6 Phases

Phase 1

Python Foundations

Wks 1–4 | 20h

Phase 2

Applied ML Foundations

Wks 5–8 | 20h

Phase 3

Deep Learning Foundations

Wks 9–10 | 10h

Phase 4

CV Deployment Bridge

Wks 11–12 | 10h

Phase 5

Main Computer Vision

Wks 13–20 | 40h

Phase 6

Capstone Build & Demo Day

Wks 21–22 | 10h

Phase 1 & 2 — Python + Applied ML Foundations (Weeks 1–8)

Wk 1

Python Fundamentals I

Variables, strings, lists, conditionals, loops — BMI calculator

Wk 2

Python Fundamentals II

Dictionaries, functions, NumPy — expense tracker project

Wk 3

Pandas, Cleaning & EDA

DataFrames, aggregation, full EDA notebook on real dataset

Wk 4

Data Visualization

Matplotlib, Seaborn, chart selection, visual storytelling

Wk 5

ML Workflow + Classification

Pipelines, leakage, baselines, logistic regression, F1/ROC

Wk 6

Validation & Trees

ROC/PR, imbalance, cross-validation, decision tree lab

Wk 7

Regression & Diagnostics

MAE/RMSE/R^2, residuals, bias-variance, model comparison

Wk 8

Ensembles & Mini-Capstone

Random Forest, boosting, K-Means, PCA — final notebook

Phase 3 & 4 — Deep Learning + CV Deployment Bridge (Weeks 9–12)

Phase 3 — Deep Learning · Week 9

Neural Networks & PyTorch

- Neurons, activations, losses, backpropagation
- PyTorch: training/validation loops & debugging
- Diagnostic MLP experiment with training curves

Phase 3 — Deep Learning · Week 10

CNNs & Transfer Learning

- Architecture families: MLP vs CNN vs Transformer
- CNN foundations: filters, feature maps, pooling
- Pretrained backbones, fine-tuning, recommendation memo

Phase 4 — Deployment Bridge · Week 11

Serving Vision Models

- FastAPI for image inference endpoints
- Streamlit UI: upload → inference → display
- First working vision demo application

Phase 4 — Deployment Bridge · Week 12

Docker, HuggingFace & Packaging

- Docker fundamentals for CV apps
- ONNX/export/runtime mindset
- HuggingFace Spaces, benchmarking, portfolio packaging

Phase 5 — Main Computer Vision (Weeks 13–16)

Week 13

Intro to CV & Real Workflow

CV tasks, dataset formats, metrics, what a CV engineer ships, common failure modes.

Output: CV pipeline map + dataset audit sheet

Week 14

Image Processing & Preprocessing

Noise, Gaussian/median filtering, Canny edge detection, normalization pipeline.

Output: Reusable preprocessing notebook/template

Week 15

Features, Keypoints & RANSAC

Harris corners, SIFT, descriptors, matching, Lowe ratio test, RANSAC.

Output: Matching demo or panorama-style mini pipeline

Week 16

Object Recognition & CNN Classification

Recognition vs detection vs segmentation, bag-of-visual-words, transfer learning.

Output: Recognition notebook with model comparison

Phase 5 — Main Computer Vision (Weeks 17–20)

Week 17

Object Detection

- IoU, precision, recall, mAP
- YOLO, SSD, RetinaNet, DETR, R-CNN family
- Detection training/inference/evaluation with mAP

⊕ *Detection mini-project + evaluation summary*

Week 18

Segmentation

- Semantic, instance & panoptic segmentation
- FCN, U-Net, Mask R-CNN, DeepLab
- Masks, workflow, mIoU/Dice metrics

⊕ *Segmentation mini-project with overlap metrics*

Week 19

Tracking & Motion Estimation

- Optical flow, tracking-by-detection
- Hungarian matching, Kalman filtering
- SORT, DeepSORT, ByteTrack practicals

⊕ *Tracking notebook + video analytics groundwork*

Week 20

Generative Vision Models

- Autoencoders, VAEs, GANs, Diffusion models
- Attention and Stable Diffusion concepts
- Latent-space intuition + generative pipeline

⊕ *Generative vision concept demo/notebook*

Phase 6 — Capstone Build & Demo Day (Weeks 21–22)

Week 21 — Build Sprint I

- ✓ Define problem and clean data
- ✓ Choose baseline, metric, architecture
- ✓ Set deployment target
- ✓ Baseline inference pipeline
- ✓ Evaluation harness setup
- ✓ Repository structure review

Output: Capstone proposal + baseline + repo skeleton

Week 22 — Sprint II + Demo Day

- ✓ Improve model with error analysis
- ✓ Polish deployment and README
- ✓ Prepare architecture presentation
- ✓ Final demo day presentation
- ✓ Architecture defense + review
- ✓ Capstone feedback session

Output: GitHub repo + demo + README + metrics + presentation

Recommended Default Capstone: Video Analytics System

The strongest default final project is a

VIDEO ANALYTICS SYSTEM

Detection + tracking + evaluation + post-processing + business analytics.

Object Detection

Per-frame detection with mAP

Multi-Object Tracking

Stable IDs and failure analysis

Analytics Export

Counts, dwell time, occupancy, heatmaps

Portfolio Package

GitHub repo, README, demo, metrics

What You'll Deliver — Phase by Phase

Phase 1

Python Mini-Projects

BMI calculator, expense tracker, EDA notebook

Phase 2

ML Pipeline Portfolio

Classification/regression/ensemble notebooks

Phase 3

Deep Learning Mini-Project

MLP diagnostics + CNN transfer comparison

Phase 4

Dockerized Vision Service

FastAPI endpoint + Streamlit UI

Phase 5

4 CV Module Projects

Detection, segmentation, tracking, generative demo

Phase 6

Interview-Ready Capstone

GitHub repo + demo + README + metrics

Who Should Enroll?

✓ Perfect For

- ✓ University students seeking AI/CV credentials
- ✓ Developers moving into computer vision
- ✓ ML practitioners adding vision skills
- ✓ Engineers in robotics/surveillance/medtech
- ✓ Anyone targeting an interview-ready CV portfolio

✗ Not Suitable If

- ✗ You want results with zero effort
- ✗ Not comfortable with iteration/debugging
- ✗ Can't commit 5 hours/week for 22 weeks
- ✗ Looking to skip foundations
- ✗ Prefer passive watching over building

No prerequisites required • All backgrounds welcome • Open enrollment

Schedule & Logistics

Period	Phase	Content
Weeks 1–4	**Phase 1**	Python, NumPy, Pandas, Data Visualization
Weeks 5–8	**Phase 2**	ML workflow, classification, regression, ensembles
Weeks 9–10	**Phase 3**	Neural networks, PyTorch, CNNs, transfer learning
Weeks 11–12	**Phase 4**	FastAPI, Streamlit, Docker, Spaces, eval packaging
Weeks 13–20	**Phase 5**	CV workflow, features, detection, segmentation, tracking
Weeks 21–22	**Phase 6**	Capstone sprints + demo day + live defense

Included: All materials • Lifetime recordings • Setup support • Alumni community • Certificate

The Anti-Hype Promise

We Show Failures

Every module covers what breaks and why.

We Teach Limitations

Learn what CV models cannot do first.

Honest About Costs

Compare free, paid, and self-hosted options.

We Build for Production

Systems that survive real deployment.

"Quietly outperforms loud marketing courses because graduates can actually build."

BUILD YOUR COMPUTER VISION

CAREER — NOT JUST KNOWLEDGE

1

Visit or Email

www.elevorix.org or ceo@elevorix.org

2

Register & Pay

Secure your spot — Early Bird pricing available

3

Get Started

Receive setup guide, join cohort workspace, ready for Week 1