



CADVertex Solutions

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NX Open Programming with ML & AI

Language: **Python**

Training Structure

Module 1: Python Programming

Module 2: NX Open - UI, Document, Sketcher, Drawing, Part and Assembly automation.

Module 3: Machine Learning, AI and integration.

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Features:

- ✓ Personal coaching - no recorded videos.
- ✓ Flexible timings.
- ✓ Weekday batches.
- ✓ Weekend batches.
- ✓ CSharp or VB.Net programming - indepth training included.
- ✓ Unlimited support after training - at no extra cost!
- ✓ 5 industry projects – listed on next page.
- ✓ Resume Preparation.
- ✓ Interview Preparation.
- ✓ Job referrals.

Training Highlights



Online Training



Flexible Timings



Trainer: 25 yrs Exp.



Duration: 6 Wks



1 Hour Daily



Basic to Advanced



10 Industry Projs



Certificate



Support after Training



CuttingEdge Tech

List of Projects

1. Geometric Calculator.
2. Batch Processor.
3. Automatic Drawing Views.
4. Parametric Shaft.
5. Assembly Cost Estimation.

Module 1: Python Programming

1. Python and IDE Installation

- Installing Python.
- Installing Python Editors – VSCode, IDLE.
- Project Explorer, output and error windows.

2. Python programming

- Setting up user interaction and collecting inputs.
- Running Python programs.
- Calculations and output display.
- Arithmetic operators.
- Using the Math library functions.
- Syntax, Comments, User Input, Print results, and control Program Flow.
- Variables: Float, Integer, and String.
- String Variables: Find, Replace, Formatting and Slicing operations.
- Datatypes and Typecasting.

3. List, Tuples, and Loops

- Lists, Tuples, Dictionaries and Sets.
- List Operations - Slicing and Data Extraction.
- String Operations - Slicing and Manipulations.
- Conditionals: If- Elif and If-Else, Nested If.
- Chaining Comparison Operators.
- Loops: For loop, nested For loops.

4. Functions and Modules

- Defining Functions and Arguments.
- Functions: Arguments, Return Statements and values.
- Functions: Multiple Return Values.
- Function Help and DocStrings.
- Modules and the Python standard library.
- Importing from modules.
- Creating Aliases.

5. Exception Handling

- Errors - syntax, logical and exceptions.
- Exception handling.
- Try Catch Except.
- Debugging Python Functions.
- Adding breakpoints and inspecting values.
- Determine source of error.
- Troubleshooting and fixing errors in the code.

6. OS Functions

- Installing 3rd party packages using pip.
- Performing File, Folder, Path and operations.
- Manipulating file paths and extensions.
- Handling Files, File Filters.
- Text files - read, append and write with practical applications.
- Storing and retrieving data.
- Folders and Folder operations.

Module 2: NX Open: UI, Document, Sketcher, Drawing, Part & Assembly Automation

8. NX Open Architecture and UI Automation

- ❖ Connect to NX.
- ❖ Loading and unloading a program.
- ❖ Interacting using the NX Listing Window.
- ❖ Accessing and modifying NX Preferences.

9. NX File Handling

- ❖ Create new NX Parts.
- ❖ Open and Close NX Parts.
- ❖ Save and SaveAs and Export NX Parts.
- ❖ Access Parts in the session.
- ❖ Work Part and Set Display Part.
- ❖ Close all Parts in the Session.

10. 2D Sketches

- ❖ Create 2D sketch using points, lines, arcs, and circles.
- ❖ Absolute and relative points.
- ❖ Create single line and multiline text or notes.
- ❖ Set note position and orientation.

11. More NX UI Elements

- ❖ User Interaction using NX message boxes.
- ❖ Picking points using the Selection manager.
- ❖ User interaction using mouse inputs.

12. NX Drawing Views

- ❖ Create standard views on drawing sheets
- ❖ Using the selection manager to interactively create drawing views on the sheet.
- ❖ Creating base view and projection views.

13. NX Parametric Parts

- ❖ Create and control parametric part in NX.
- ❖ Expression table.
- ❖ Searching expressions by name and extracting values.
- ❖ **Industry Project** - Update parametric shaft with keyway.

14. NX Assemblies

- ❖ Traverse the NX assembly structure.
- ❖ Creating NX assembly alias.
- ❖ Root component and children components.
- ❖ Extracting the name and cost of assembly components.
- ❖ **Industry Project** - Assembly Cost Estimation.

15. NX Journal Recording

- ❖ Journal Recording - steps and precautions.
- ❖ Integrating journal code with Visual Studio.
- ❖ Customize the NX Ribbon UI:
 - Adding new tabs.
 - Adding new buttons.
 - Customizing buttons.
 - Running NXOpen apps from buttons.

Module 3: Machine Learning and AI

16. Machine Learning - NumPy

- Arrays.
- One Dimensional Array.
- Multidimensional Array.
- Create Arrays from Data.
- Create array from Ranges.
- Shape.
- Array Intersection.
- Array Difference.
- Sum.
- Slicing Array.

17. Machine Learning - Pandas

- Series.
- DataFrames.
- Dataframe Indexing.
- Dataframe Head, Tail.
- Dataframe Shape.
- Read DataFrame from CSV.

18. Matplotlib Visualization

- Line Plots.
- Sub Plots.
- Plot Properties - Color, Style.
- Grid, xLabel, yLabel.
- Bar Plots.
- Bar SubPlots and Orientation.
- Scatter Plots and Subplots.
- Mixed Plots and Overlapping.
- Markers and LineWidth.
- Exporting Plots.
- Pie Charts.

19. Decision Trees

- Decision Tree Classifiers.
- Dataframe.
- Extracting Features & Labels from a Dataframe.
- Fitting Features & Labels into a decision algorithm.
- Predicting values based on classification.
- Dual Classification and Multiclass classification.
- Reading CSV data into Dataframes.
- Separating input and output.
- Dropping frames from dataframes.
- Label Encoders.
- Fit Transforms.
- Predicting results.

20. Linear Regression Analysis

- Reading a CSV data file.
- Create Linear regression model.
- Fit data columns directly to the algorithm.
- Determine coefficient and intercept.
- Reading inputs data from CSV.
- Predicting output for entire column.
- Exporting output dataframes to CSV.
- Create a scatter plot of the data.

21. K-Means Clustering

- Importing data.
- Determining clusters.
- Determining the cluster to which a point belongs.
- Visualize cluster using scatter plots.
- Visualize cluster centers.

22. How to use ChatGPT for API Development

- Creating smart queries.
- Enhancing queries for best results.
- Refining queries for exploring more APIs.
- ChatGPT Code cleanup and adaptation.

23. Integrate AI and ML in Automation

- ❖ **Capstone Project** Integrate Automation with Machine Learning to create AI-enabled apps.

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- ✓ ML and AI Programming Tips



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- ❖ SolidWorks Automation: VB.Net or CSharp or Python
- ❖ Solid Edge Automation: VB.Net or CSharp or Python
- ❖ Inventor Automation: VB.Net or CSharp or Python

- ❖ NX Open: VB.Net or CSharp with Win Forms
- ❖ NX Open: VB.Net or CSharp with Block UI Styler
- ❖ Knowledge Fusion
- ❖ Knowledge Fusion with Block UI Styler

- ❖ [Revit Automation using CSharp.Net + Dynamo](#)
- ❖ [Tekla Automation using CSharp.Net](#)

- ❖ cMayoCAD: Learn to build a new CAD program from scratch using a Geometric Modeling Kernel and CSharp

- ❖ CATIA Automation with Python and Machine Learning
- ❖ Solid Edge Automation with Python + Machine Learning
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- ❖ Fast track course in Python with Machine Learning for CSharp experts

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