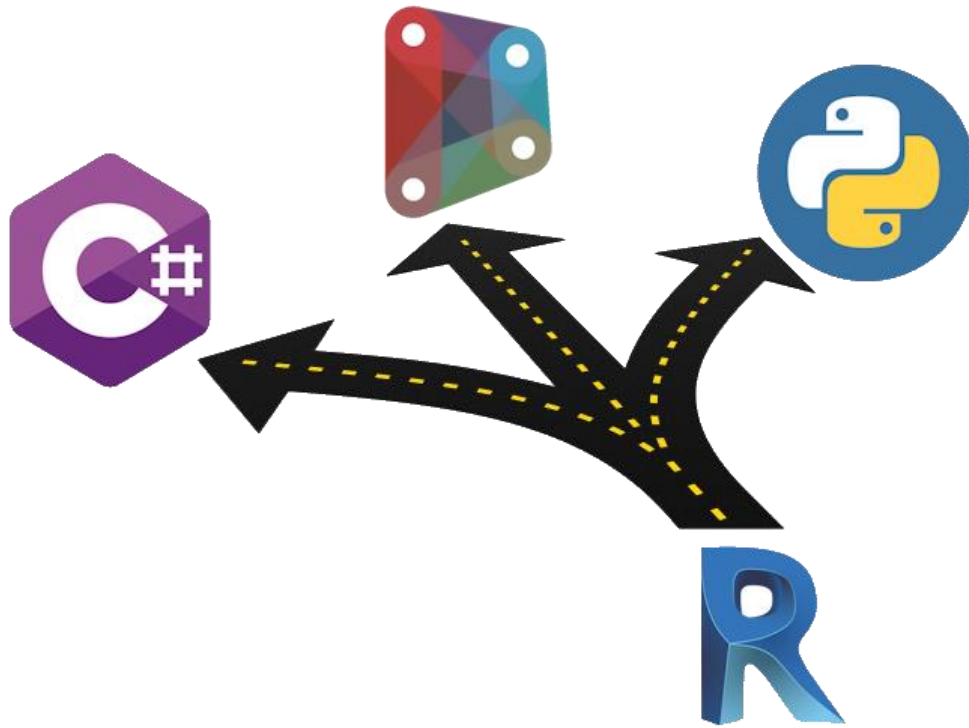


# After Revit... What?

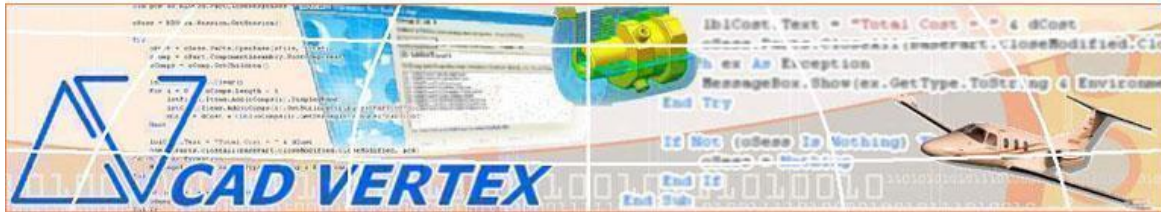
Unable to decide..  
CSharp, Dynamo, or Python?



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+ Plugins + AI

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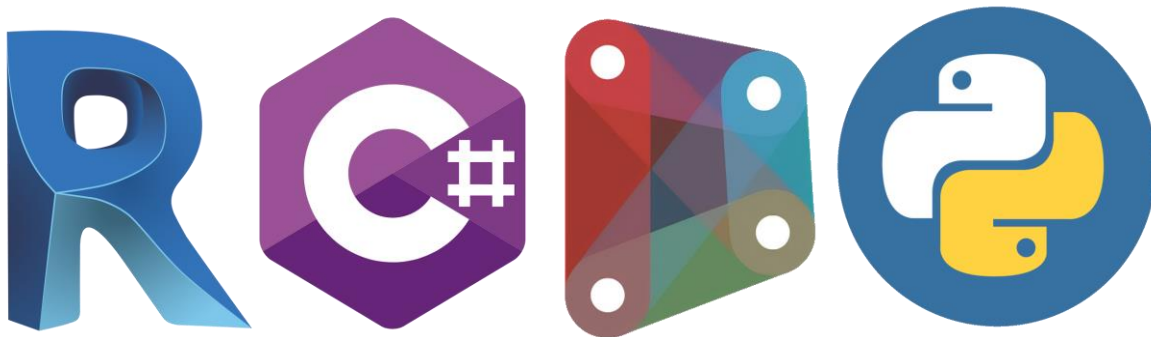
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## Training Structure

**Module 1:** Python Programming including LINQ and OOPs.

**Module 2:** CSharp Programming including LINQ and OOPs.

**Module 3:** Revit API using CSharp: Deep Dive and Advanced Techniques.

**Module 4:** Revit API using Python: Deep Dive and Advanced Techniques.

**Module 5:** Dynamo with Python Nodes + Machine Learning + AI + PyRevit, Python Revit Shell.

## Features:

- ✓ LIVE coaching + recorded videos.
- ✓ Flexible timings.
- ✓ Weekday batches.
- ✓ Weekend batches.
- ✓ Modern Python programming included.
- ✓ Unlimited support after training: at no extra cost!
- ✓ Industry projects.

## Highlights:

- ✓ Daily exercises and review quiz.
- ✓ Best practices for programming in Revit.
- ✓ Resume Preparation.
- ✓ Interview Preparation.
- ✓ 100 Interview QA.
- ✓ Job referrals in top companies.

## Bonus:

- ✓ Free study material.
- ✓ Free sample programs.
- ✓ Free Dynamo scripts.
- ✓ Free Python scripts.
- ✓ Free plugins.
- ✓ Free Python templates.

## Unique:

- ✓ PyRevit.
- ✓ AI with Machine Learning.
- ✓ Revit Python Shell.
- ✓ CPython3 and IronPython.
- ✓ PyCharm.



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

## Module 2: Python Programming

### 1. Installation and Basics

- Installing Python.
- Installing Python Editor – PyCharm, VS Code, IDLE.
- Project Explorer, output and error windows.

### 2. Introduction to programming

- Setting up user interaction and collecting inputs.
- Running Python programs.
- Calculations and output display.
- Operators – arithmetic, logical, comparison & assignment.
- Using the Math library functions.
- Syntax, Comments, User Input, Print results, and control Program Flow.
- Variables: Float, Integer, String, and Boolean.
- String Variables: Find, Replace, Formatting and Slicing operations.
- Datatypes, Typecasting and Validations.

### 3. List, Tuples, and Loops

- Lists, Tuples, Dictionaries and Sets.
- List comprehensions.
- 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, While loop, Nested loops.

### 4. Functions and Modules

- Defining Functions and Arguments.
- Functions: Arguments, Return Statements and values.
- Functions: Optional Arguments.
- Functions: Multiple Return Values.
- Function Help and DocStrings.
- Modules and the Python standard library.
- Importing from modules.
- Creating Aliases.
- Life of variables, global and local variables.
- Lambda functions.
- Errors - syntax, logical and exceptions.
- Exception handling.
- LINQ – Language Integrated Queries, and Lambda functions.

## 5. Exception Handling

- Try Catch Except.
- Debugging Python Functions.
- Adding breakpoints and inspecting values.
- Determine source of error.
- Troubleshooting and fix errors in the code.

## 6. Object Oriented Programming

- Creating Classes and objects.
- Methods and Properties.
- `__init__()` Function.
- `__str__()` Function.
- The self Parameter.
- Modify Object Properties.
- Inheritance.
- Creating a Parent Class.
- Create a Child or Derived Class.
- Add Properties and Methods.
- Polymorphism.
- Encapsulation.

## 7. 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.

## 8. Tkinter GUI Programming

- Geometry and mainloop.
- Project** - Geometric calculator.
- Setting dialog box properties, title, icon, size and location.
- Adding widgets and adjusting their properties and placement.
- Tkinter Datatypes - Double, Integer, Strings, and Boolean.
- Data Type Conversion - tkinter variables and python variables.
- Labels - static and dynamic.
- Entry Textboxes - storing user input from textboxes into variables.
- Setting default values and last used values in text boxes.
- Button widget - formatting and calling functions.
- Check boxes and radio buttons.

## 9. Advanced GUI Programming

- Listboxes - single selection and multiple selections.
- Listboxes - adding items static and dynamic.
- Listbox selection event binding.
- Listbox display total count and selection count.
- Listbox, remove selected item and remove all items.
- Listbox - add items from textbox.
  
- Scrollbar - adding scrollbar to a listbox.
- Spinner widget - setting range and layout.
- Scale widget - setting range and layout.
  
- Images - displaying images in a dialog box.
  
- File selection dialog.
- Single and multiple files.
- Adding file filters.
- Folder selection dialog.
- Selecting all files from folder dialog.
- Adding file filters for folder dialog.
- Opening files in associated application.
  
- Message boxes - information, query and warning .
- Configuring single line and multiline messages.
- Button configurations and icon synchronizing.
- Checking message box responses against button configurations.
  
- Option menu, add and remove items.
- Handling multiple dialogs.
- Adding pulldown menus, adding menu items.
- Cascading menus and adding commands to menu items.

## Module 2: CSharp Programming

### 10. Installing Visual Studio

- Installing an older version.
- Setting the default language.
- Setting the environment and preferences.
- Customizing the layout.
- Solution Explorer, output and error windows.

### 11. Console applications and introduction to programming

- Selecting a project template.
- Setting up user interaction and collecting inputs.
- Calculations and output display.
- Using the .Net Math library functions.

### 12. Creating a Windows Forms Application

- Setting dialog box properties.
- Toolbox and the Properties window.
- Adding controls: Button, TextBox, Label, Checkbox, RadioButton.
- Adding images to PictureBox.
- Composite controls: ListBox and ComboBox.
- Adjusting various properties for each type of control.
- Variable types - Double, Integer, String and Boolean.
- Acquiring user input from various controls into variables.

### 13. Arrays

- Filling arrays and reading array elements.
- Filling ListBoxes with array elements.
- For Loop and ForEach loop.
- ArrayLists and Lists - advantages and limitations.

### 14. Functions and Subroutines

- Arguments, return types and return values in functions.
- ref and out clauses.
- Enums and constants.
- Errors - syntax, logical and exceptions.
- Exception handling.
- Post-build events.
- Runtime update.
- LINQ – Language Integrated Queries, and Lambda functions.
  - Select, FindAll, Take, TakeWhile, Skip, SkipWhile, First queries.

## **15. Object Oriented Programming**

- Creating a class.
- Adding member functions.
- Static and non-static methods.
- Public and Private methods.
- Adding member variables.
- Encapsulation.
- Polymorphism and function overloading.
- Abstraction.
- Class Attributes.

## **Module 3 : Revit API using CSharp**

### **16. Creating a Plugin**

- The Revit API.
- Viewing the Revit API.
- Setting up Visual Studio.
- Add classes and implement interface.
- The IExternalCommand.
- Creating a command.
- Task dialog.
- Task dialog builder.
- Invoking the application in Revit.

### **17. Plugin Usage**

- Registering add-ins.
- Compiling the code.
- Creating a manifest file.
- Lookup and Snoop techniques.

### **18. Selections in Revit**

- Element Selection.
- Retrieving properties of selected elements.
- Selection Filter.
- Filters Basic.
- Get an element using filters.
- Logical Filters.
- Filtering using LINQ techniques.
- Querying the FilteredElementCollector.
- Retrieve Elements and element ids.

### **19. Working with Revit Elements**

- Classifying elements.
- Retrieving element information.
- Filtered Element Collector.
- Creating a collector.



## 20. Transactions

- Start, commit and rollback transactions.
- Modifying elements.
- Creating families.
  
- Creating line-based elements.
- Creating loop elements.

## 21. Parameters

- Parameter Object Hierarchy
- Retrieve Parameter Value
- Set Parameter Value

## 22. Element Creation

- **Project:** Creating walls.
- Single Wall Creation
- Multiple Wall Creation
- Floor Creation
- Element locations.
- Point locations and location curves.
- Editing methods.
- Single Transaction.
- Group Transactions.

## 23. Automating Drafting and Drawing

- Tagging elements.
- Creating automatic element tags.
- Creating sheets.
- Placing views.
- Creating a Plan View.

## 24. Excel Automation and Integration

- Integrating Revit API with Excel.
- Reading data from Excel and creating objects in Revit.
- Writing out Revit model data to Excel sheets.
- Invoking Excel from CSharp.
- Creating new workbook.
- Connecting to Excel.
- Connecting to existing worksheets.
- Accessing range and cells.
- Writing and reading values from cells.
- Formulas and results.
- Formatting cells - font and layout.
- Excel Macro recording and integration.

- ❖ **Project** - Writing Revit Information to Excel.
- ❖ **Project** - Reading from Excel into Revit.

## Module 4 : Revit API using Python

### 25. Creating a Plugin

- Element Selection.
- Retrieve Elements and element ids.
- Retrieving properties of selected elements.
- Task Dialogs.
- Configuring Task Dialogs.
- Title, instructions, contents, Header and Footer.
- Command buttons, cancellation, Command buttons.
- Links and Display actions.
- Selection Filter.
- Filters Basic.
- Get an element using filters.
- Filtered Element Collector.
- Inspect Elements inside the collection.
- Built In Categories.
- Filtering using LINQ techniques.
- Querying the Filtered Element Collector.

Project: Adding View Tags.

Project: Move Room Tag to Center.

Project: Adding Sheets in Revit.

- Working with Parameters.
- Reading and Writing Parameters.
- Getting parameters from Revit elements.
- Getting parameter by Name.
- Getting the value from a parameter.
- Setting a Parameter value.
- Family Parameters.
- Built-In Parameters.
- Working with transaction.
- Start, commit and rollback transactions.
- Single Transaction.
- Group Transactions.
- Element Creation.
- Project: Creating walls.
- Single Wall Creation.
- Multiple Wall Creation.

- Floor Creation.
- Element locations.
- Point locations and location curves.
- Editing methods.
- Element Geometry and Vectors.
- Intersecting geometry.
- Vectors and projecting rays.
- Finding shortest distance and interference.

## Module 5: AI Programming in Revit API and Dynamo

### Highlights:

*Dynamo*

*Machine Learning using Python*

*Create AI-Powered Revit Plugins*

*Create AI-Powered Dynamo Nodes*

*PyRevit*

*Revit Python Shell*

*Revit Lookup*

### 26. Dynamo

- What is Dynamo.
- What is Visual Programming.
- Getting Started with Dynamo.
- The Building Blocks of Dynamo.
- Automatic Manual Execution.
- Parts of a Node.
- Node Types: Create, Action, and Query.
- Searching, browsing and adding nodes.
- Quick Nodes.
- Node wiring and data flow.
- Unwiring nodes.
- Grouping and ungrouping.
- Duplicating and renaming nodes.
- Input, output and previews.
- Watching node output.
- DesignScript Language in detail.
- Code blocks.
- Numerical inputs and Sliders.
- Code Vs. Nodes.
- Using Variables in nodes.
- Statements and values.
- Lists and List Slicing.

- Arithmetic and logical Operators.
- Built Functions.
- Custom Functions.
- List Range and indices.
- Graph view and background view.
- Zoom , Pan and rotate graphs.
- Mouse and keyboard shortcuts.
- Creating Custom Nodes.
- Custom Nodes – Computational.
- Custom Nodes – Geometrical.
- Store and Distribute Dynamo Scripts.
- Save and Share Dynamo Custom Notes.

## **27. Programming Python Nodes in Dynamo**

- Input and output wiring.
- Arguments, Arrays and Lists.
- Coupling Output of Python Script to nodes.
- Performing Arithmetic operations in Python nodes.
- Performing Geometrical operations in Python nodes.
- Using Proto Geometry.
- Variables.
- Points and Coordinates.
- List and List Slicing.
- For Loop.
- For Loop with If.
- While Loop.
- Break and Continue.
- Shorthand for Loops.
- Node Lacing and Nested Loops.
- Functions and Arguments.
- Create and Use Python Modules.
- Use Built-in Modules.

## **28. Using Dynamo with Revit**

- Creating geometry - point, lines.
- Creating Revit geometry.
- Lists and Ranges.
- Grids and matrix.
- Lacing techniques.
- Visualizing parameter data.
- Create, Action, Query nodes.
- Filter list by element type.
- Automating repetitive tasks.
- How to create column grids.
- Working with data in Excel.
- Family types and instances.

- Creating custom nodes.
- Boolean Expressions in DesignScript
- Generating Number Range using DesignScript
- Generating Lists Using DesignScript
- Generating multiple geometry Using DesignScript

Project: Working with data in Excel.

Project: Create column grids.

- Using the Dynamo player in Revit

## **29. Using Python Nodes in Dynamo with Revit API**

- Modules and Libraries.
- Using the Revit node library.
- Layout of Python nodes in Dynamo.
- Extracting information from Revit using Python.
- Creating Elements in Revit.
- Revit Objects Vs .Dynamo Objects.
- Convert between Dynamo Geometry and Revit Geometry.

**Project:** Stair Paths.

**Project:** Room Finishes.

## **30. Machine Learning and AI - NumPy - Numerical and Scientific Processing**

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

**Pandas** - Big Data Processing

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

### **31. 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.

### **32. 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

### **33. Linear Regression Analysis**

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

### **34. K-Means Clustering**

- Project Clustering Symbol Errors based on Drawing Sheet Zones
- Importing data
- Determining clusters
- Determining the cluster to which a point belongs
- Visualize cluster using scatter plots
- Visualize cluster centers

**Project:** Integrating Machine Learning Models into Revit Plugins: with Project

**Project:** Integrating Machine Learning Models into Dynamo Nodes: with Project

### **35. Revit Lookup**

- Download and installation.
- Exploring, Revit objects and values.
- Analyzing current data state.
- Snooping Revit Document.
- Snooping current selection.
- Inspecting Edges, Faces and Linked Elements.
- Manipulating Revit Values and Parameters.

### **36. Revit Python Shell**

- Installation and configuration
- CPython3 and IronPython
- Similarity and differences
- Features and advantages
- Understanding ByteCode
- Create Revit Plugins
- Deploy Plugins using the RpsAddin

### **37. PyCharm Editor**

- How to install and configure.
- Environments and configuration
- Keyboard shortcuts

### **38. PyRevit**

- What is PyRevit?
- How to install?
- Benefits and utilities.
- How to create Plugins using PyRevit.

### **39. Revit API Docs - How to use?**

- Exploring Samples
- How to convert .Net samples to Python.

### **40. How to use ChatGPT for Revit API Development**

#### 41. Useful Dynamo resources

- Best practices for programming in Revit.
  - Resume Preparation.
  - Interview Preparation.
  - 100 Interview QA.
  
  - Free study material.
  - Free sample programs.
  - Free projects.
  - Free Python scripts.
  - Free plugins.
  - Free Python Templates.
- 

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- ❖ CATIA Automation with Python and Machine Learning
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