

# Excel VBA Fundamentals

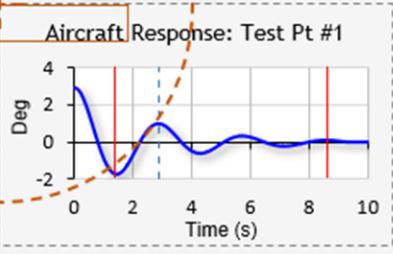
## for Engineers and Scientists

Test Data Folder:  
C:\Users\EMAGENIT\Desktop\Test Data

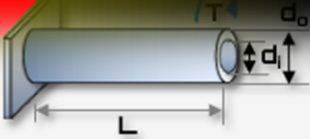
File: 5-1-24.xlsx  
Test Point: Test Point #1  
Report Type: Type 1

Build Test Chart   Refresh File List

Aircraft Response: Test Pt #1



Time (s)



Parameters	Units
Twist	1.5 deg
G	8.00E+10 GPa
L	1 m
di	30 mm
do	50 mm

Output	Units
T	=ShaftTorque(calc_di_in,calc_do_in,calc_L_in,calc_G_in,calc_tw_in)

Function ShaftTorque(D\_i As Single, D\_o As Single, L As Double, G As Double, Tw As Double) As Double  
Dim wf As WorksheetFunction, ri As Double

Set wf = WorksheetFunction  
Tw = wf.Radians(Tw)

....

Station	RainFall (in)	Area (mi <sup>2</sup> )
Station 1	1.85	1
Station 2	1.54	99
Station 3	1.42	0.85
Station 4	1.1	1.85
Station 5	0.85	1.21

Month: Mar  
Rainfall avg: 1.58

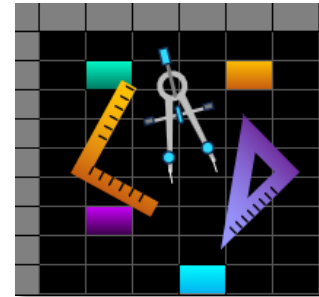
Load Data / Calc Thiessen Polygon

**Solve multi-step engineering and science problems with the click of a button.** Learn the fundamentals of using Excel VBA to perform calculations, control models, analyze data, build charts, and create reports.

# How our class can help you.

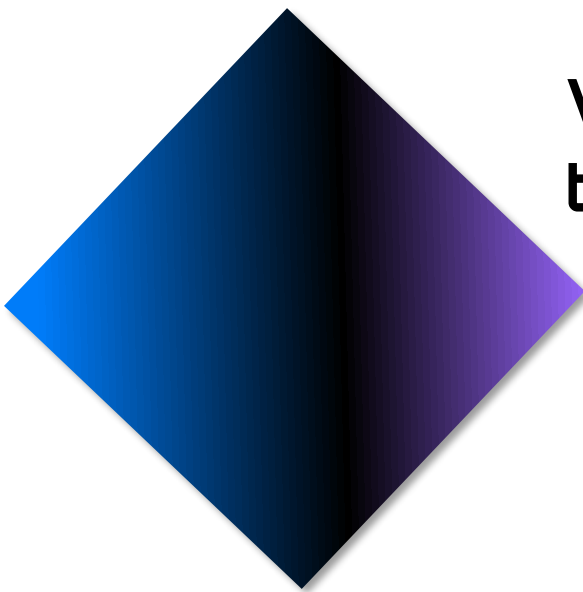
**Our 2-day class** shows you how to use Excel VBA to build powerful automated engineering and science tools.

It covers the basics like how to use modules; the VBA Editor; type and debug VBA code; develop program logic; and use objects, properties, and methods.



[Class Examples >](#)

In addition to the basics, it discusses how to use VBA to command workbooks, worksheets, ranges, charts, filters, PivotTables... and other key Excel elements. Our training also covers how to automate calculations; build tables; control models; read and fill in forms; process data; and build custom functions.



## Who should attend the class?

Engineers, scientists, and technicians. Class examples will be determined by those in attendance.

# Minimum Excel skills needed for the class.

Select this Excel training if you or your group have:

- Have never or not programmed in over a year
- Just used the Record Macro tool to obtain VBA code
- Programmed but have not used objects before
- Used Excel and know its operational capabilities
- Built basic worksheet formulas (=A1+A2) and used worksheet functions like SUM
- Used Excel data processing tools like Sort, Autofilter, Advanced Filter, Group, and Remove Duplicates
- Built charts manually



## How we run the class.

We focus our training on what our customers need. When training begins, we analyze those needs and shift our outline appropriately. We will stress or add topics that our customers want.

## Class formats and signup.

**In-Person, Virtually, and Onsite.** Our live hands-on classes can be attended virtually or in-person. Please visit our public signup page for [class times and pricing >](#). Contact EMAGENIT directly at **1.629.325.9937** for more information about our onsites.

# Key Excel VBA topics covered in class.

- Review of the Excel VBA language, VBA Editor, debugging, procedures, and modules
- Automating common Excel elements used by engineers and scientists in VBA
- How to control (value, copy, insert...) cells and ranges in your Excel VBA code
- Using worksheet and VBA functions in your code to find, calculate, and lookup table data
- Automating worksheet formula construction and calculations with Excel VBA
- Laying out and calculating model / problems with Excel VBA
- Using loops and logic to process and calculate worksheet data and text files
- How to control workbooks, worksheets, and formats with Excel VBA
- How to automatically fill and read worksheet forms with Excel VBA
- Automating Excel's data tools like Text Wizard, PivotTables, Sort, AutoFilter...
- Using Excel VBA to automatically build / format engineering and science charts
- Designing user interfaces (UIs) to control your Excel VBA tools
- Constructing UDFs for calculation, numerical analysis, and data processing purposes

# Detailed class syllabus.

## Day-1

### Excel VBA Language, VBA Editor, and Debugging Review

**\* This section is discussed when needed in the class.**

- Review of the VBA Editor windows, toolbars, and debugger
- Review of the VBA language, modules, procedures, statements, and typing rules
- How to use shapes and pictures to create buttons that run your procedures
- Writing logic in VBA using the <, >, <=... operators along with IF, And, OR...
- Overview of objects, properties, and methods and how they control Excel?
- How to create object expressions in VBA and use Set statements to track objects
- Using Record Macro to investigate Excel VBA command syntax and arguments

### How to Control Ranges, Run Functions, and Lookup Data in VBA

- How to track worksheet ranges and cells in your Excel VBA code
- How to cut, copy, paste, insert, clear... cells, rows, columns with VBA
- How to run worksheet and VBA functions in your macro code
- Analyzing dates and times with VBA
- Performing math, statistical, and trig calculations in your macro code
- Performing various table lookups using Excel VBA and functions
- Using Excel VBA to place outputs and formulas around a table

## Model / Problem Layout and Calculation with Excel VBA

- How to layout model / problem interfaces that can be read by Excel VBA
- Controlling cell input using Data Validation and ActiveX controls
- How to use Excel VBA to read parameter information off the worksheet
- Automating calculations using operators (+,-,\*...), functions, logic, and variables
- Leveraging Conditional Formatting to automatically format input / outputs
- Using cell names and Excel tables in your code to track inputs and data
- Automatically creating, modifying, and deleting formulas with Excel VBA
- Using Excel VBA to control Excel's calculation mode

## Processing and Filling Worksheet Table Data Using Loops and Logic

- Using the Cells and Range properties inside a loop to access worksheet data
- Using loops, logic, and counters to process common worksheet data configurations
- Filling in data and formulas in a table with VBA
- Using macros to color cell data based on limits
- Tracking a report workbook in your code and transferring data to it

## Controlling Text Data and Text Files in Your VBA Code

- Performing common text operations in your code using VBA and functions
- Using loops, logic, concatenation, and functions to clean / parse worksheet text
- Using Text Wizard and Text to Columns in VBA to process worksheet text

- How to open, read, write to, and close text files with VBA
- Using string concatenation in VBA to create text that is written to a text file
- The basics of outputting text file data to the worksheet for analysis

## Controlling Workbooks, Worksheets, and Formats with VBA

- How to open, close, and save workbooks with Excel VBA
- Using the Set statement and names to track workbooks and worksheets
- How to add, delete, move, name, and protect worksheets with Excel VBA
- Automatically formatting worksheet tables (color, fonts, alignment...) with VBA
- Scanning open workbook / worksheets for data using loops and logic

## Day-2

## Using Excel VBA to Fill, Read, and Consolidate Worksheet Forms

- Worksheet form layout, cell naming, and controlling inputs with Data Validation
- How to fill a worksheet form using Excel VBA
- Designing your code to loop through a form gathering its data
- Consolidating form data in a master workbook table using Excel VBA

## Automating Excel's Data Tools to Rapidly Process Data

- Controlling the Sort, Remove Duplicates, and Grouping feature with VBA
- Controlling AutoFilter and Advanced Filter in your macro code
- Using macros to copy / paste filtered data to report workbook / worksheets

- How to use VBA to stack filtered data on a report worksheet
- Using Excel VBA and Record Macro to build PivotTables and Excel tables

## Automating Charts with Excel VBA

- How to use macros to create a chart sheet or embedded chart
- Using Excel VBA to update range sources for chart data
- Adding and deleting chart elements with VBA
- Formatting axes, series, gridlines...using Excel VBA
- Using VBA to color data points and move, format, change data labels
- Loading chart templates using Excel VBA

## Building User Interfaces to Run Your Excel VBA Tools

- Design strategies for laying out UIs on the worksheet to run your code
- Building a file picker / saver in your macro code to command files
- How to use Data Validation, shapes, and cells to create powerful UI inputs
- Using logic in your VBA code to integrate your UI inputs

## Creating Custom Worksheet Functions (UDFs) in VBA

- Excel VBA design rules for custom worksheet functions (UDFs)
- Designing UDFs to accept cells, ranges, values, and arrays as arguments
- Using loops, logic, and functions in UDFs to perform complex calculations
- Returning scalars and arrays back to the worksheet from UDFs
- Packaging your UDFs in a function library Add-In for Excel wide use