Three-Day Combo Course

Spreadsheet Problem-Solving for Chemical Engineers

This two-day course provides a comprehensive hands-on experience in solving numerical problems often encountered by chemical engineers using Microsoft Excel. Scenarios include material and energy balances, fluid flow, heat transfer, separations, chemical reactions, and process flowsheets. Methods included are equation-solving, data analysis, optimization and process economics.

Excel VBA Programming for Chemical Engineers

In one day, participants are introduced to the Visual Basic for Applications (VBA) programming language in conjunction with Microsoft Excel. The basics of VBA are introduced, including macros, user-defined functions, and add-ins. The course equips chemical engineers with the tools and skills to develop VBA applications that include Excel-VBA communication, streamlining spreadsheet-based calculations, developing user interfaces, and communicating to other software packages, such as process simulators and math software.

Course Outline

Day One

Basic Spreadsheet Skills
- Configuring Excel for engineering calculations
- Efficient spreadsheet manipulations
- Formulas, cell addressing and range names
- Creating engineering graphs

Process Calculations
- Dealing with engineering formulas and units
- Debugging spreadsheet calculations
- Flowsheet calculations with recycle
- Targeting calculations
- Case studies

Day Two

Dealing the Data
- Table look-up and interpolation
  - Incorporation table look-up in engineering calculations
  - Continuous tables
- Quadrature and smoothing
- Excel's Data Analysis Toolpak
- Histograms and distributions
- Model building through curve-fitting

Numerical Problem-Solving

- Solving algebraic equations
  - Single nonlinear equations
  - Sets of linear equations
  - Sets of nonlinear equations
  - Numerical solution of differential equations
- Optimization calculations
- Capstone design calculations
- Economic evaluation
- Cash flow and profitability

Day Three

- Getting Started with VBA
  - Configuring Excel for VBA programming
  - The Visual Basic Editor (VBE) environment
  - Recording and editing macros
  - VBE debugging tools
- User-Defined Functions
  - Programming user-defined functions (UDFs)
  - Including programming structure in UDFs
  - Developing array functions and borrowing Excel functions
  - Packaging collections of functions in an Excel add-in

Delving into VBA Programming
- Communicating with Excel – object-oriented concepts
- Data types and scope
- VBA programming structures
- Modular organization of VBA programs

User Interfaces and VBA Applications
- Message boxes, input boxes and on-sheet buttons
- Programming event handlers
- UserForms
- Integration course concepts into an Excel VBA application
- Interfacing with outside programs