

AVEVA E3D PML Customization & Automation

Target Audience

This course is designed for professionals who want to customize, automate, and extend the functionality of AVEVA E3D using Programmable Macro Language (PML).

- AVEVA E3D Administrators and System Administrators
- E3D Designers, Engineers, and Lead Designers
- CAD/BIM Application Specialists and Coordinators
- AVEVA E3D Implementation and Support Engineers
- Software Developers involved in engineering application customization
- Technical Consultants responsible for process automation and workflow optimization
- Users seeking to develop custom forms, menus, reports, and automation tools within AVEVA E3D

Course Objectives

Upon completion of this course, participants will be able to understand and utilize AVEVA Programmable Macro Language (PML) to enhance engineering productivity and automate repetitive tasks within AVEVA E3D. The course focuses on developing practical skills for creating custom applications, user interfaces, and database-driven solutions.

Participants will learn to:

- Understand the architecture, syntax, and programming principles of PML.
- Develop reusable macros, functions, and object-oriented PML applications.
- Interact with AVEVA E3D databases to retrieve, modify, and validate model information.
- Create professional user interfaces using Forms, Gadgets, Menus, and Toolbars.
- Implement event-driven programming techniques and error-handling mechanisms.
- Develop, secure, test, and deploy customized PML solutions that improve engineering workflows and project efficiency.

Course Outcomes

After successfully completing this course, participants will be able to:

- Create and manage PML macros, functions, methods, and custom objects for automation tasks.
- Develop custom E3D applications that interact directly with design databases and engineering data.
- Build interactive forms, dialogs, menus, and toolbars to enhance the AVEVA E3D user experience.
- Implement advanced programming concepts including collections, arrays, event-driven callbacks, and object-oriented development.

- Apply debugging, tracing, and error-handling techniques to create robust and maintainable applications.
- Integrate custom workflows, reporting tools, and validation utilities within AVEVA E3D environments.
- Deploy secure and upgrade-friendly PML solutions using industry-standard coding practices.
- Increase productivity by automating repetitive design, modeling, and data management activities across AVEVA E3D projects.

Course Outline

Duration: 40 Hours

The course comprises **40 hours** of instructor-led theory and hands-on labs and is divided into **10 modules**. Each module is followed by practical exercises to reinforce concepts and improve productivity in real-world engineering projects.

Table of Contents

Module 1: Introduction to AVEVA PML & E3D Customization

- Overview of PML Architecture
- PML 1 vs PML 2
- Role of PML in AVEVA E3D
- PML File Structure and Naming Conventions
- Coding Standards and Best Practices
- Understanding PML Environment Variables
- Loading and Managing PML Files
- PML Development Workflow

Module 2: PML Programming Fundamentals

- Variables and Data Types
- Local and Global Variables
- Objects, Members, and Attributes
- User-Defined Objects
- Functions and Procedures
- Methods and Method Overloading
- Arrays and Collections

- String Manipulation Techniques

Module 3: Expressions and Program Control

- PML Expressions
- Arithmetic and Logical Operators
- Boolean Expressions
- Conditional Statements (IF / ELSE)
- Looping Constructs
- DO Loops and Nested Loops
- Break and Skip Statements
- Label-Based Navigation

Module 4: Developing PML Macros

- Introduction to Macros
- Macro File Structure
- Macro Execution Methods
- Macro Parameters and Arguments
- Using Functions within Macros
- Synonyms and Command Shortcuts
- Reusable Macro Development
- Macro Deployment Strategies

Module 5: AVEVA E3D Database Interaction

- Understanding E3D Database Structure
- Accessing DB Elements using PML
- Reading Element Attributes
- Writing and Updating Attribute Values
- Working with Current Elements
- Evaluating Selected Objects
- Querying Model Information
- Database Navigation Techniques
- Undo and Redo Operations

Module 6: Advanced Data Handling & Collections

- Arrays and Multi-Dimensional Arrays
- Arrays of Objects
- Sorting and Filtering Collections
- Collection Methods
- Data Aggregation Techniques
- Dynamic Data Processing
- Report Data Preparation
- Batch Data Manipulation

Module 7: PML Form Design & User Interfaces

- Introduction to Form Design
- Form Definition Files
- Form Types and Layouts
- Form Attributes and Properties
- Creating Form Members
- Managing Form Variables
- Dynamic Form Behavior
- Form Initialization Methods
- Resizable and Intelligent Forms

Module 8: Gadgets, Menus & Toolbars Development

- Understanding Form Gadgets
- Buttons, Text Fields, Lists and Trees
- Menu Design Fundamentals
- Creating Custom Menus
- Creating Toolbars
- Menu Field Management
- Command Registration
- Resource Files and Icons
- Custom Ribbon Integration

Module 9: Event-Driven Programming & Error Handling

- Event-Driven Architecture
- Form Callbacks
- Gadget Callbacks
- Menu Callbacks
- Open Callbacks
- Event Processing
- Error Conditions and Trapping
- ONERROR Handling
- Debugging Techniques
- PML Tracing and Diagnostics

Module 10: Advanced PML Automation & Deployment

- File and Directory Handling
- Reading and Writing External Files
- Unicode Support
- PML Encryption and Security
- Packaging Custom Applications
- Custom Commands and Utilities
- Performance Optimization
- Deployment Best Practices
- Upgrade-Safe Customization Techniques