



Advanced Programming – the Language of SAS

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Duration: 14 – 16 hours (plus additional time for exercises)

Learning Overview:

The Advanced Programming course covers aspects of the programming language of SAS that will enable you to understand and write more complex code and help you stand out from the crowd.

There are comprehensive exercises throughout to help assess and reinforce your learning.

This instructor-led blended learning course is delivered online over 3 days with the opportunity to join an End of Day Q&A session with the instructor at the end of each day.

Learning Outcomes:

By the end of this course you will be able to:

1. Use Advanced Programming methods to perform table lookups
- using Formats, Arrays and Hash/Iter Objects
2. Choose options to Combine Data using Data Step and PROC SQL
3. Apply Advanced techniques to select observations and update values
4. Use Advanced Functions and create Custom Functions with Proc FCMP
5. Code PERL Regular Expressions to Match, Change and Validate data

Delivery Schedule:

This course is delivered live online over 2 days.

On day 1 we invite you to join a short online welcome to meet your instructor and introduce you to our Digital Learning platform before getting started on the course.

In addition, you will also need to set aside time to complete the Hands-On exercises.

	09:00 - 12:00	13:00 - 17:00
Day 1	Welcome and Advanced Programming (Live Online Class 1)	Advanced Programming (Live Online Class 2)
Day 2	Advanced Programming (Live Online Class 3)	Advanced Programming (Live Online Class 4)

Pre-requisites:

To get the most out of this course, it is expected that you should have attended our Fundamentals and Intermediate courses in the language of SAS (or comparable courses) or have completed nine months of developing code in the language of SAS including topics:

- Use of Global statements e.g. LIBNAME, FILENAME and OPTIONS
- Use of functions to transform character data (e.g. SCAN, FIND, SUBSTR)
- Use of functions to transform numeric data (e.g. CEIL, INT, FLOOR, ROUND)
- Use of functions to transform dates (e.g. DAY, MONTH, YEAR, INTCK)
- KEEP and DROP statements and dataset options to select variables
- IF and WHERE statements to select observations
- Conditional Processing with IF-THEN-ELSE
- Iterative DO Loops
- Conditional Do Loops – DO WHILE and DO UNTIL
- Compile-Time statements (e.g. LENGTH, RETAIN)
- Combining Data Sets Vertically and Horizontally
- Summarising data with the FREQ, MEANS and TABULATE procedures

For the hands-on practice activities in the course, you will need access to an environment that runs the programming Language of SAS. On our courses, we signpost you to some of the free tools available.

Check out the link below to review system requirements:

- [SAS® OnDemand for Academics](#)

Learning Modules:

Sorting Datasets

Learning Objective: Describe methods to improve sort performance

- Review of the PROC SORT procedure
- Parallel Processing
- Space Requirements for Sorting
- Selecting Observations

Selecting Observations

Learning Objective: Explain techniques for selecting observations

- Using the DISTINCT keyword in PROC SQL
- BY-Group processing
- Using FIRST. and LAST. in the DATA step

Lookup Tables: Formats

Learning Objective: Create, Maintain and Use Formats as Lookup Tables

- Create and Use Formats
- Use Formats as lookup tables
- Create and Maintain Formats from a dataset
- Picture Formats

Lookup Tables: Arrays

Learning Objective: Define and Use Arrays as Lookup Tables

- One-Dimensional Arrays – Definition and Usage
- DIM Function
- One-Dimensional Array Lookup Tables
- Multi-Dimensional Array Lookup Tables
- Create a Multi-Dimensional Array from a Dataset

Lookup Tables: Hash and Hiter Objects

Learning Objective: Define, Load and Use Hash Objects as Lookup Tables

- Define a Hash Object
- Load Data into a Hash Object
- Lookup Data using Hash Object Methods
- Chained Lookups
- Hiter Objects

Lookup Tables: Combining Data

Learning Objective: Combining Data using Data Step and PROC SQL

- Data Step Merges
- PROC SQL Joins
- Multiple SET Statements
- Combining Data using an Index
- Combining Detail and Summary Data

Modifying Data

Learning Objective: Modify/Update Data Values using the MODIFY Statement

- The MODIFY Statement
- Master and Transaction Datasets
- Using an Index
- Control Statements
- Handling Errors

Advanced Functions

Learning Objective: Creating and Using Advanced Functions

- Using the LAG function
- Using the COUNT, COUNTC and COUNTW functions
- Using the FIND, FINDC and FINDW functions
- Creating custom functions with Proc FCMP

PERL Regular Expression

Learning Objective: Use PERL Regular Expressions to Match, Change and Validate data

- PERL Regular Expressions – PRXMATCH, PRXPARSE and PRXCHANGE
- Metacharacters
- PRX#Functions
- Use PERL Regular Expressions to validate data