



Business & Technology ConsultingSM
Education Solutions

Programming III Advanced Techniques

Course Length: 3 days **CEUs** 1.8

Format: Hands on Training

AUDIENCE

This course is designed to show experienced SAS® programmers how to use the Data Step to read and manipulate complex forms of data, and how to use SAS utilities to manage SAS libraries. Working efficiently in SAS® is crucial, especially when processing large files or information on computers with resource or technology constraints. Students will learn techniques to reduce program execution time and unnecessary use of resources. Merging many data files has always been a resource burden. We examine the different ways of pulling data together without using merge processing. We found other techniques that save coding and processing time, while being easy to use. We discuss how indexes help speed up searching through data. This class also covers how to give different views of the same data to different users, without giving them code. Coding for the end user becomes much simpler. We teach how to improve the performance and efficiency of your SAS programs. This course is designed for experienced SAS users to enhance existing skills. Efficient SAS programming methods and techniques are studied in depth.

BENEFITS

You will learn to:

- Read any type of raw data into SAS
- Create information with ODS and multiple versions of data
- Perform complex merging and joining of data
- Work with data audit trails and complex, multidimensional arrays
- Set up data constraints
- Join summary and detail data
- Understand how to benchmark to choose the right programming method
- Organize and sort SAS data sets
- Index and compress SAS data sets
- Evaluate the best table look up techniques to avoid merging
- Make the best use of system resources

PREREQUISITES

Programming II: Data Manipulation Using the Data Step and understand:

- Creating summary information, SAS functions, transforming data
- DROP, KEEP and RENAME processing
- Match merging and interleaving data
- Data step compile and execution
- Basic operating system commands and directory structures
- Libname statements
- Array Processing and Do Loops

COURSE TOPICS

Programming III Advanced Techniques

Reading Data into SAS

- Reading all types of flat files and hierarchical data
- Reading mixed records formats
- Reading packed and zoned decimal data
- Working with EBCDIC and ASCII data
- Advance INFILE Statement options
- Setting up indexes in SAS
- Joining summary information with detail data

Data Utilities in SAS

- Viewing information with Data Step Views
- Outputting SAS data sets with ODS
- Using Generation Data Sets to create historical information

Understanding Data

- Working with Data Storage in SAS libraries
- Comparing data sets with Proc Compare

Manipulating Data with Utility Procedures

- Using Proc Transpose to restructure data
- Using Proc Copy to copy data sets and upgrade them to Version 8
- Using Proc Datasets to modify data set structure and attributes
- Using a single libref to reference all SAS libraries

SAS Utilities to Manage Data

- Using the MODIFY statement to update data in place
- Data transformation
- Using Audit trails to track changes
- Using Arrays for repetitive calculations
- Setting up Integrity Constraints to maintain clean data

Formatting Data for Better Presentations

- How to set up user defined formats
- How to use permanent formats
- How to set up dynamic formats with SAS data sets

Efficiency Techniques and Benchmarking

- CPU, I/O and memory
- STIMER, FULLSTIMER and MEMRPT options
- Reducing disk space
- Reducing memory requirements with BUFFNO and BUFSIZE

Data Storage Methods and Compression

- SAS engines
- Space reduction
- Data set compression



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Indexing Techniques and Uses

- When to use indexes
- Creating and deleting indexes
- Index advantages and disadvantages

SAS Data Set Modification and Space Reduction

- Data set library structure
- Multi-engine architecture
- Proc Access
- Stored Program facility
- Data step views
- Using the libname statement against RDBMs

Table Lookup Techniques

- Lookups using formats
- Lookups using indexes and KEY=
- Lookups using merges
- Lookups using arrays
- Lookups using SQL joins
- Lookups using macros

Sorting Techniques and Efficiencies for Large Data Sets

- Working with duplicates
- Controlling secondary sort orders
- Using the sort flag
- SAS sort vs. Host Sort
- Using the where statement
- Appending
- Using the tagsort option
- Determining sorting resources
- Sorting RDBMs information