



...Maximizing your investment in the SAS® System...  
and those in your organization who use it...

**Advanced SAS Programming Techniques takes you beyond the basics by showing you how to harness the power of SAS data step processing and procedure tools to manage and prepare data for subsequent steps in your project or analysis.**

After taking this seminar you will be able to:

- Understand the processes by which a SAS Data Step creates a SAS data set
- Control the execution of a Data Step that reads data from either a flat file or from an existing data set
- Take actions at the end of the Data Step's execution phase
- Keep track of events that occur during your Data Step's execution and report them to the SASLOG at the end of the Step.
- Create multiple data sets during a single Data Step
- Apply FIRST. and LAST. programming in a Data Step to "work across" observations
- Join multiple SAS datasets together using a range of techniques
- Facilitate successful program completion by using programming language functions in your Data Steps

# SAS® 201: Advanced SAS Programming Techniques



**Presentation Formats:**  
One-day classroom or multi-day on-site with hands-on exercises and customization

## Overview

This session gives you the insights and tools necessary to apply advanced SAS programming tools to your data. Building on the concepts and techniques presented in our *SAS 101: An Introduction to the SAS System* one-day seminar, this class helps you go beyond the basics and equips you to utilize advanced SAS Data Step and BASE SAS Procedure tools that provide even more power and flexibility in your programming. This seminar also addresses some of the new Data Step functions added in SAS 9 Software.

## Intended Audience

*SAS 201: Advanced Programming Techniques* is intended to be a successful learning experience for if you have already attended our SAS 101 seminar or a similar introductory training seminar, or have about six months to one year of experience writing Data and Procedure step code. The seminar materials and presentations assume that you are already familiar with core SAS System concepts such as data steps and data sets, data set descriptor portion, observation, variable, label and format.

## Seminar Topics:

### The Data Step Execution Process: How Does SAS Create a Data Set?

- Compilation Phase
- Execution Phase
- Understanding the Program Data Vector (PDV) and What Happens There During the Execution Phase of the Data Step

### Controlling the Data Step Execution Phase

- Creating SAS Data Sets from Raw Data Files Using INPUT Statements
- Advanced Methods of Reading Raw Data for Programming Efficiency
- Keeping Track of Events During the Execution Phase and Placing Customized Results in the SASLOG at "Task End"
- Using the RETAIN Statement to "Hold" Values of Variables in the PDV Across Iterations of the Execution Phase
- Creating One Output Observation from Multiple Input Observations

### Merging and Appending Data Sets

- Appending Files using PROC APPEND vs. Implied Concatenation in a Data Step
- Simple Match Merges
- Complex Match Merges
- One-to-Many Merges
- One-to-one Merges and Why to Avoid Them
- Conditional/Match Merges: Assigning Values to New Variables in a Data Step Based on the Results of a Merge

### Using Data Set Options

- KEEP and DROP
- IN=, RENAME, WHERE=

### Using SAS Programming Language Functions

- SUM, MEAN, N, MISS, MAX, MIN
- LENGTH, SUBSTR, CAT, CATX

## Contact Sierra Information Services For More Information:

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## About the Instructor

This seminar is written and presented by Andrew Karp, who started his own SAS Software consulting and training firm, Sierra Information Services, in 1994. Prior to starting Sierra he used SAS Software extensively to manage and analyze data while holding positions with PriceWaterhouseCoopers, Federal Express Corporation, Pacific Gas & Electric Company and Kaiser Foundation Health Plan. A 25-year SAS user, Andrew is a SAS Certified Professional™ who has presented this, and other, training seminars to SAS users in the United States, England, Scotland, Belgium, Australia, New Zealand and the People's Republic of China.

He has served on the technical review teams for seven books published by SAS Institute and has been an invited speaker at twelve consecutive SAS Global Forum/SAS User Group International conferences, as well as other events for SAS users in seven countries. Andrew earned undergraduate and graduate degrees from The George Washington University and taught for UC Berkeley's Extension Division from 1989 to 1995. He has also been a visiting lecturer in the Dept. of Experimental Statistics at Louisiana State University and at the University of Auckland in New Zealand.

## About Sierra Information Services

Sierra Information Services is a **leading independent provider of SAS Software** consulting and training services. Our firm is based in the California Wine Country region north of San Francisco but **travel both domestically and internationally to work with clients and present training seminars**. Sierra offers clients a **wide range of support**, including SAS programming, data analysis/data mining with SAS tools, as well as the design and delivery of customized SAS Software training solutions tailored to the client's individual needs. Since its inception in 1994 Sierra has provided consulting and/or training services to, among others, Wells Fargo Bank, Bear Creek Corporation, Limited Brands, IBM, American Honda Motor Company, Lloyd's Bank/TSB, Capitol One Financial Services, Inc., Discover Financial Services, Inc., the US Department of Commerce and the US Federal Communications Commission. We have also provided consulting and training for numerous public and private sector entities in the United Kingdom, Belgium, Australia and New Zealand.

In addition to training solutions developed by Sierra's founder, Andrew Karp (see instructor's bio above), Sierra also works with other leading SAS experts to offer their training seminars around the United States. Sierra is proud to have well-known experts such as Art Carpenter, Michael Raithel, and David Cassell present their training seminars under our auspices.

For the most current list of our public seminars, or to learn more about how Sierra can assist you and your organization, please visit our web site at [www.SierraInformation.com](http://www.SierraInformation.com) or call us a (707) 360 5383. We look forward to hearing from you soon!



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