Course Outline
for
SAS Clinical Training
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SAS Clinical Introduction

- History of SAS
- SAS comes in ERP sector or not? Why?
- Role of Statistical Analysis in Clinical Research Study and Banking analysis
- SAS role in Clinical Research Study and Banking analysis
- Data modeling and Data mining concepts
- Project management in Clinical Research Study analysis and Banking analysis
- What is Clinical research Study?
- What is Protocol and role of Protocol in Clinical Research Study?
- What is randomization and non randomization? Which is playing
- Main role in Clinical research study? 11. What is SOP (Standard operating Procedure)?
- What is DBMS?
- Role of DBMS team in Clinical Research Study
- What is CDM (Clinical data management)?
- Importance of CDM systems for data loading
- What is SAP (Statistical Analysis Plan)?
- Role of SAP in Clinical Research Study
- SAS Work Flow in Clinical Research Study
- Relation between SAS and DBMS
- Interaction between SAS with CDMs for data access
- Various report generation in Clinical Research Study
- Role of SAS in Credit Analysis and Different Banking Channels
- When will go any Industry for Data modeling and Data mining
- Role of SAS in Data modeling and Data mining
GETTING STARTED WITH SAS SYSTEMS

- Basic operating system commands, operating system file structures
- Managing windows in SAS window environment
- How to run SAS application in different modes and in different environment like Windows, Unix and Mainframes.
- Use of different kind of SAS products and how to use in SAS application.
- Difference between the SAS products.
- Why using the SAS in different sectors
- How to use the Data Step to read and manipulate complex forms of data
- Write Data and Proc Steps
- Data step compile and execution
- To run SAS application on different modes
- Reading internal raw data into SAS
- Read any type of external raw data into SAS
- Reading raw data SAS environment into DATASET using Input statement & advance INFILE Statement options
- Working with Data Storage in SAS libraries creation for user defined libraries and multi-engine architecture
- Using a single libref to reference some or all SAS libraries reading and printing mixed records formats
- Reading packed and zoned decimal data Working with EBCDIC and ASCII data
- Reading data from dataset to another dataset
- To manage the SAS window environment use with Global options
- Reducing memory requirements with BUFFNO and BUFSIZE working with SAS dataset options
- To manage existing data with controlling statements and expressions
- Creating summary information, SAS functions, transforming data
Changing variable types using the PUT and INPUT functions
Summarizing Data Files
Generation Data Sets to create historical information SAS
To export data from datasets to delimiter files using with dataset block
Understand error messages in the SAS log and debug your program
Use with error handling concepts

**Perform Iterative Processing on Data:**
- Using Do loops for repetitive calculations and processing
- Using Arrays to process across an observations and processing
- Using DO WHILE and DO UNTIL statements for conditional looping

**Data Storage Methods And Compression**
- SAS engines
- Space reduction
- Data set compression

**Indexing Techniques And Uses**
- When to use indexes
- Creating and deleting indexes
- Index advantages and disadvantages

**Utilities to Manage And Work With Datasets**
- Data Using append procedure to add date values in existing data set
- Using the update statement to update data in existing data set
- Using the MODIFY statements to update and modify data in place
- Merging concepts
- Data transformation
- Concatenation concept in merging
- Interleaving concept in merging
- Different kind of match merging using MERGE statement using the contribution option
Using ODS concept to generate reports

Relevant Base SAS Procedures

- Organize and sort SAS data sets and working with duplicates
- To generate listing output use print
- Comparing data sets with Proc Compare
- To create user defined informat and format statements use format
- Using Proc Copy to copy data sets
- Importance of contents procedure
- Reading data from dataset for reporting use report
- Using Proc Datasets to modify data set structure, attributes, how to use permanent formats,
- Setting up Integrity Constraints to maintain clean data and Setting up indexes
- Role of ODS concepts to reporting SAS output

How to use PROC SQL to retrieve information from their data

- Introduction to SQL Concepts
- The origin of SQL and why we use it
- Create new tables, indexes, views, and reports

Simple Queries:

- Understanding the Select statement
- How to specify columns and subset rows
- Using functions to summarize and group data
- Ordering data and formatting output
- Performing group analysis, remerging and sub queries

Joining Data:

- What are Cartesian Products; what is Join
- Inner, Full, Outer, Left and Right Joins
- Set Operator us such as union and intersection Joining multiple tables
• Proc SQL as compared to the Data Step

Working with Tables, Views and Indexes:
• Creating Indexes and tables in SQL
• Why we use views in SQL
• Performance and space issues

Advanced SQL Topics:
• How to use SAS macros in SQL
• How dictionary tables and views can simplify programming SQL options
• How to retrieve raw data different from databases to SAS environment using SQL statements
• To create table in different databases using SAS sql statements
• To manage in different databases using SAS sql statements

Pass through facility:
• Uses of pass through facility
• How to communicate with other database like Access, Oracle, DB2 …..
• To control and manage other databases from the Sas
• To access required data from other databases
• To create Data warehousing environment

Basic Statistical Procedures (SAS/STAT) and reporting procedure
• To summary Statistical analysis summary procedure
• Producing Statistics with means procedure
• Testing categorical Data with FREQ PROCEDURE
• Producing Statistics with tabulate procedure
• Reporting areas in SAS
• To generate report use with proc report
• Examining Data with Univariate procedure
• T-tests and non parametric comparison
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- Proc ANOVA for one way Analysis of Variance
- Examining correlations with PROC CORR
- PROC REG for Regression Analysis

Creating bar & pie charts
- Producing BAR & pie Chart
- Enhancing O/P with Titles Footnotes Color & Font
- Producing & overlaying lots
- Controlling Appearance of axe’s
- Generating graphs use with ODS

How to work use with SAS/Access & SAS/connect
- To import data from different PC files use import procedure
- To export data from datasets to different PC files use export procedure
- To import data from different source use access procedure
- Uses of dbload procedure and how to work
- To transport datasets one environment to another environment and one version to another version (Windows to UNIX) use with cprot and cimport procedure
- How to use upload procedure
- How to use download procedure

How to work use with Macro language Introduction to Macros
- How the SAS macro language works
- What is role of macro in SAS
- Introduction to tokenizing, compiling and executing a SAS program
- How the macro processor works

Applying Macro Variables in a SAS Program
- Applying automatic macro variables
- Designing customized macro variables
- Substituting the macro variables in SAS programming
Displaying macro variable values in the SAS log
Applying quoting functions with macros

Incorporating SAS Macros in the Data Step
- Designing macro variables during Data Step execution
- Indirectly referencing macro variables
- Resolving macro variables during Data Step execution
- Understanding the functionality and application of the SYSMGET function and SYSMPUT routine
- Using the INTO clause to build macro variables during PROC SQL execution

Running Macro Programs in SAS Software
- Designing and implementing simple macros and reduce customizing Sas application
- To develop reusable application use with Macro
- Specifying conditional coding inside a macro
- The macro compilation and execution processes in the macro processor SAS system options used for debugging macros
- Reviewing error and warning log messages displayed by the Macro processor
- Designing and using macros containing parameters within them
- Using positional and keyword parameters in macro calls
- Difference between global and local symbol tables
- Nested macros and symbol table hierarchies
- Concepts in Macro functions, Macro interface and Macro quoting functions and how to use Macro coding

Techniques for Storing Macros
- Understanding the autocall feature
- Permanently storing and using compiled macros
- Writing efficient macro programs
DEBUGGING SAS PROGRAMS

- SAS programs that work
- Fixing programs that don’t work
- Searching for the missing semicolon
- Input statement reaching past the end of line
- Lost Card
- Invalid Data
- How to handle different kind of SAS errors
- Missing VALUES were Generated
- Numeric Values have been converted to Charc
- Wrong results but no error message
- The Data Step Debugger
- SAS truncated a character variable
- SAS stops in the middle of job
- SAS runs out of memory or disk space

Statistical Data warehousing

- Data warehousing Concepts
- What is ETL?
- SAS/ETL Concepts
- What is OLAP?
- SAS/OLAP Concepts
- Role of Pass through facility to create Data warehousing Environment