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SAS CLINICAL PROGRAMMING

INSTRUCTOR LED ONLINE TRAINING PROGRAM WITH PROJECT

SAS clinical programming refers to the use of SAS software for managing, analyzing, and reporting clinical trial data in the pharmaceutical and healthcare industry. SAS (Statistical Analysis System) provides a powerful and versatile platform that enables clinical programmers to handle complex data sets, perform statistical analyses, generate tables and listings, and ensure data quality and regulatory compliance.

With expertise in SAS clinical programming, professionals can support critical activities such as clinical trial design, data validation, safety analysis, efficacy evaluation, and regulatory submissions. SAS clinical programming plays a vital role in advancing evidence-based medicine, improving patient outcomes, and driving successful clinical research and development initiatives.

Our SAS Clinical Trials Instructor-Led Online Training with Project is a comprehensive and transformative program designed to equip professionals with the essential skills needed to excel in the field of SAS clinical trials. Led by experienced instructors, this training offers a unique blend of theoretical knowledge and practical application, empowering participants to leverage SAS software for efficient clinical trial data analysis.

Through hands-on projects, participants will gain real-world experience, enhancing their capabilities to make informed decisions, ensure regulatory compliance, and contribute to successful clinical trials.

Training Duration
75 hours (3 and half months)

Mode of Training
Instructor Led online training.

Batches

Global Career Opportunities:
SAS skills are in high demand worldwide. Open doors to global career opportunities in renowned pharmaceutical companies, clinical research organizations, regulatory agencies, and healthcare analytics firms. Join the league of successful professionals working on groundbreaking projects.

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COURSE CONTENT / TOPICS:

BASE SAS CERTIFICATION MODULE

Introduction of SAS Software

- Introduction using SAS
- Components of SAS System
- Functionality of SAS System
- The SAS Work Environment
- Introduction of SAS Windows
- Creating and running a SAS Program
- Submitting and correcting the program
- Saving files and clearing text from windows
- Rules for entering SAS statements
- Rules for creating new SAS dataset

Working in the SAS Environment

- Creating and managing SAS Libraries.
- Overview of SAS Data states.
- Types of Libraries.
- Storing files temporarily and permanently Referencing SAS files.
- SAS options Usecase
  - Linesize
  - Pagesize
  - Fistobs
  - Obs
  - Yearcuroff

Creation database from raw data

- Steps to create a SAS dataset.
- Create SAS dataset from instream data
- Reading data files using the INFILE statement
- Creating SAS dataset using text file.
- Creating SAS dataset using text file with delimiters.
  Options: Delimiter= delimiter(s) Dsd (delimiter-sensitive data)
- Creating SAS dataset using structured text file.
- Creating SAS dataset using unstructured text file.
- Creating SAS dataset using Excel file.

Creation database from raw data

- Colon,
- Ampersand,
- Single Trailing@,
- Double Trailing @@
- Advanced input pointers Multiple line input and Multiple INPUT statements / and # pointer

Output delivery system

- Concepts of output delivery system.
- How ODS works and viewing output of ODS in different format.
  - ODS / html file
  - ODS / pdf file
  - ODS / RTF
  - ODS/CSVALL

Combination the dataset in SAS

- Conceptual Merging
- One to one merging
- One to Many merging
- Many to One
- Many to Many
- Physical merging
- Vertically Combining Data (Concatenation and Interleaving)
- Horizontally Combining data (Mach merging & Updates)
- Proc Append

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Function

- Character function
  - Upcase
  - Lowcase
  - Propcase
  - Length, Lengthc ,Lengthn
  - Scan
  - Substar
  - Concatination - || , cat
  - Trim
  - Left
  - Right
  - Index and Indexw
  - Find
  - TRANWRD
  - COMPRESS with all options
  - prxmatch

Numerical function

- INT
- Round
- Ceil
- floor

Arithmetical function

- Plus, Minus ,division, Multiplication

Mathematical function

- Sum
- Mean
- Max
- Min
- N
- Range
- STD
- SQRT
- ABS

Data conversion

- Character to Number
- Number to Character

Loops in SAS: Do Loops

- Syntax and creation of Do loops.
- Conditional Do loops (Do until, Do while, byclause).
- Nesting Do loops

Date Function

- Today()
- date()
- time()
- day ()
- Qtr (Date)
- Weekday (Date)
- Year (Date)
- Month (Date),
- Mdy (Month,day,year)
- Intck ('interval',from,to)
- Intnx ('interval',start-from,increment)
- Minute (Time | Datetime)
- Second (Time | Datetime)
- YEARIF()

Array

- Array and Array-name
- Subscript
- Variable-list
- Array-values
- Accessing Array Values Using the of Operator
- Using the in Operator

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SAS Statements

- Character function
  - Rename
  - Retain
  - Drop and Keep
  - If
  - If-then else
  - if Then Do.
  - Set

Declarative Statements in the Data

- Attrib
- By
- Where

SAS Executable Statements

- Delete
- Put
- Merge
- Sum

PROCEDURES

- Procedure Contents.
- Procedure Options.
- Procedure Append.
- Procedure Print.
- Procedure Report.
- Procedure Datasets.
- Procedure Tabulate.
- Procedure Summary
- Procedure Import.
- Procedure Sort
- Procedure Export.
- Procedure Format.
- Procedure Compare.
- Procedure Transpose.

SAS / STAT

- Procedure UNIVARIATE
- Procedure MEANS
- Procedure FREQ
- Procedure Chart, Gchart, Gplot.
- Procedure RANK
- Procedure ANOVA
- Procedure REG
- Procedure TTEST (Paired)
- Procedure CORR(correlation)

Graphs

- Introduction to graphics.
- Introduction to graphics.
  - Procedure plot
  - Procedure Gplot
  - Procedure Chart
  - Procedure Gchart
  - Procedure SGPANEL
  - Procedure SGPLOT

ADVANCE SAS TOPIC

Proc Sql

- Proc Sql concept
- Keywords overview
- Retrieving Data from a Single Table
- Retrieving Data from Multiple Tables
- Creating and Updating Tables
- Create table Sql / drop Sql / insert Sql /update Sql / select Sql /where Sql / operators Sql / join Sql / union Sql / order by Sql/group by
- Creating a Summary Report
- Creating a Customized Sort Order
- Handle the duplicates in Proc sql
- Create and delete Index using SQL
- Joins in proc SQL
  - Horizontal join
    - Inner Join
    - Outer join (Left join, Right join, Full Join)
  - Vertical merging using set operators
    - UNION
    - EXCEPT
    - INTERSECT
    - OUTER UNION

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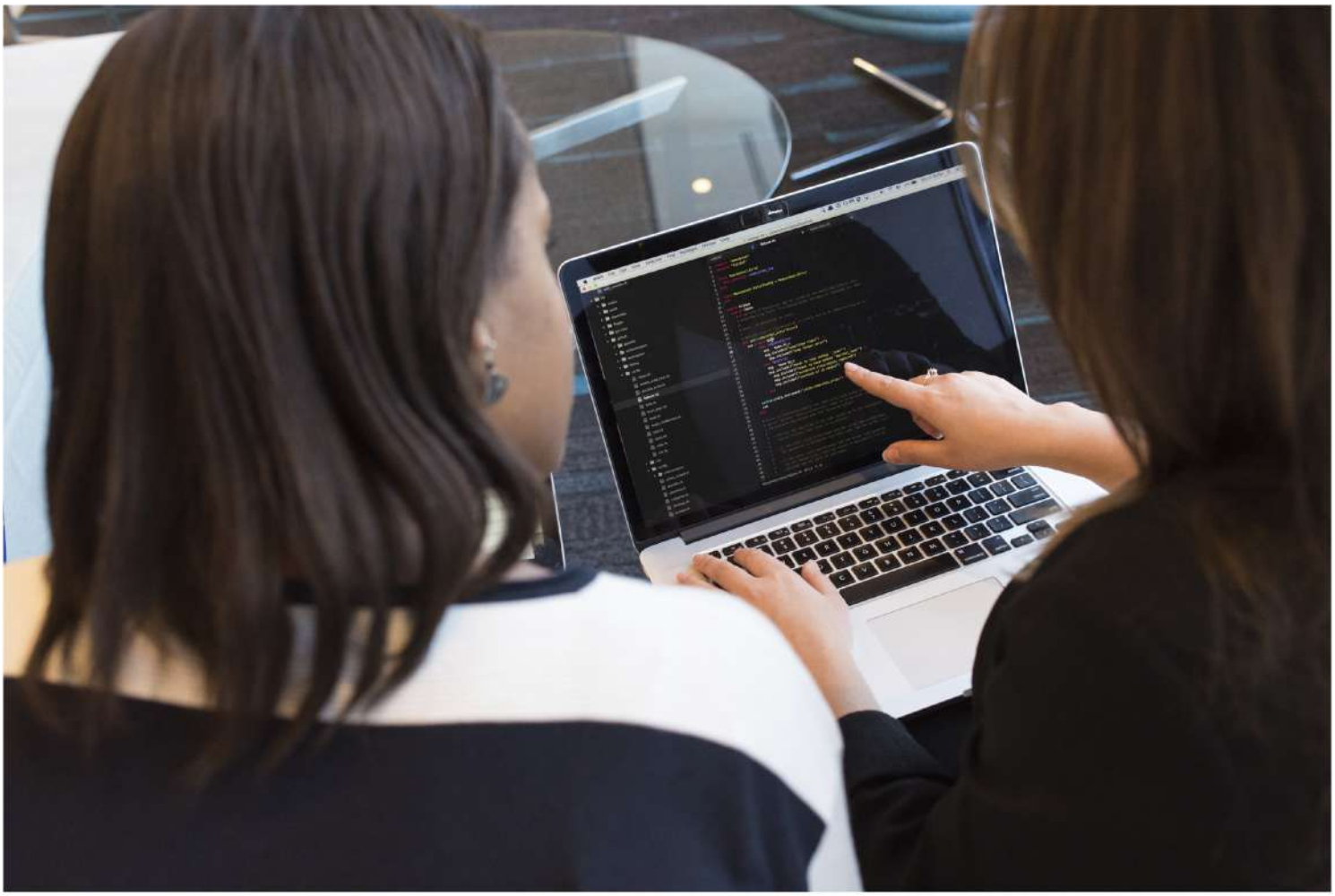
Macro

- Create and use user-defined and automatic macro variables within the SAS Macro Language.
- An Introduction to SAS Macros Functions of the SASmacro processor
- Defining and using a macro
- Macro Concepts & Advantages
- Macros And Macro Variables (Local and Global)
- Creating Macro Variables & Using Macro Variables Invoking
- Create Macro by
    - %Let
    - %Call SYMPUT
    - %Macro %mend
    - Create the macro by Proc Sql
    - %INCLUDE
- A Macro Adding Parameters to Macros
- Writing Macros with Conditional Logic SAS / Macros Using Various Procedures in Macros External Macros & Automatic Macro
- System options for debugging macro
- Nesting of Macros Multiple and Multi-Level Macros
- Macro Functions
- Macro processor flow
- Avoid macro errors
- Positional macro parameters
- Keyword Macro parameters
- Mixed macro parameters



SAS Clinical Syllabus

SAS Clinical Programming Fundamentals

- Understanding major phases (Phase I – IV) of clinical trials and clinical data management.
- Overview of Clinical trial and drug development process, from discovery to bringing a biopharmaceutical product to market
- Explain SAS role in Clinical Research.
- Food and Drug Administration (FDA) regulations and Guidance (21 CFR part 11, GCP, eCTD)
- Understanding clinical study and documents {e.g. Protocols, Case Report Form (CRF), annotated and electronic Case Report Form (aCRF and eCRF), Statistical Analysis Plan (SAP)}
- Introduction to Clinical Trial Data Know how to categorize and summarize clinical data
- Learn to prepare and clean clinical trial data Studying and classifying different types of clinical trial data {Safety (ISS) and Efficacy (ISE) Data Getting acquainted with new Clinical Data Interchange Standards Consortium (CDISC)

Clinical Concept common programming.

- Create summary report on Adverse event and concomitant medication.
- Understanding and creating Time-to-Event, Change-from-Baseline, Windowing etc..
- Concepts for creating & transforming analysis data sets (Using DATA steps and PROC TRANSPOSE)
- Apply 'observation carry forward' techniques to clinical trials data (LOCF, BOCF, WOCF).

TLF(Tables, Listings and Graphs/ Figures)

- Introduction on documents (Mock shells, SAP, Protocol, Specification file).
- Description knows about the documents required and procurers to create quality TLF's.
- Development of Demographic Listing Description, how to create demographic related listings creation with quality.
- Development of Adverse event Listing Description, how to create adverse event related listings creation with quality.
- Development of Lab Listing Description, how to create Lab related Tables creation with quality.
- Understand the logics and how to check the counts.
- Using ODS with PROC REPORT to generate TFLS as per clinical requirement.
- Comparing Data sets using PROC COMPARE

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CDISC (SDTM and ADAM)

- Understand concept and rules of CDISC
- Understand Concept of SDTM.
  - What is SDTM
  - Purpose of SDTM
  - Domain, Variable concept
  - Role Concept
  - Core Variable Concept
  - Introduction of MedDRA
  - SDTM Standard Domain Models
  - General Observation Classes
  - Controlled Terminology
  - SDTM Mapping Process
  - DESIGN AND IMPLEMENTATION

SDTM Project

- SAS Program for mapping NON SDTM to SDTM .
- Implement SDTM concept on SAS using live project
- Describe the contents and purpose of define.xml.
- Creating SDTM Tabulations (Datasets)

SDTM Datasets project contain below domains

- DM
- SUPPDM
- Findings - LB
- Events - AE
- Interventions - EX
- Trial design datasets – TA,TE,TI,TS,TV

Understand Concept of ADAM.

- What is ADAM
- Fundamental principles of ADAM
- Traceability
- ADAM datasets workflow
- ADAM Related Process
- Data Metadata
- Variable Metadata
- Controlled Terminology/Code Lists
- Core variables
- Concept of ADAM dataset structure (ADSL and BDS)

Implement ADAM concept on SAS using live project

- Creating ADAM (Datasets)
- Different types of ADAM Datasets
  - ADSL
  - ADAE
  - ADEF
  - ADtte

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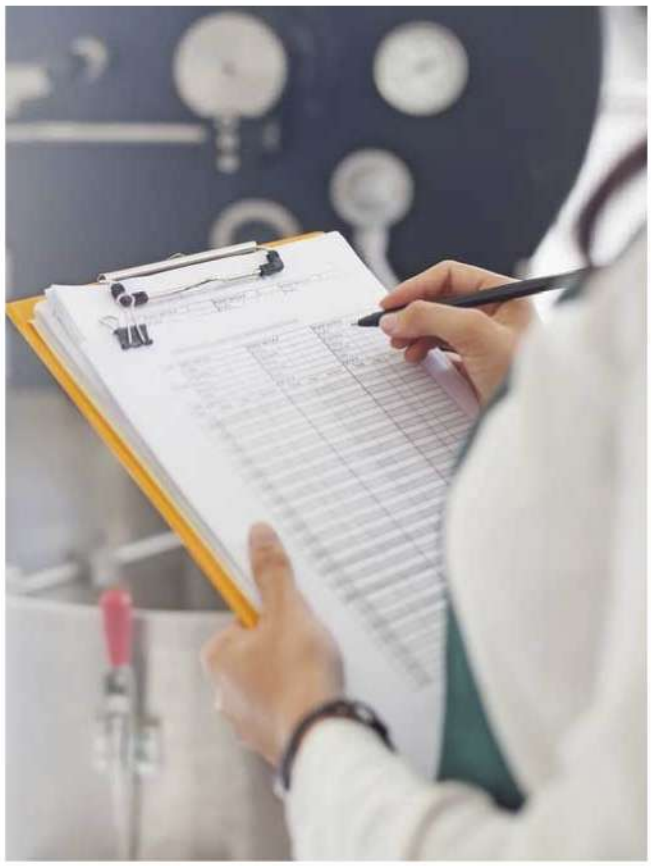
CLINICAL PROJECT

- 1 Project (SDTM)
- 1 Project (ADAM)
- 5 case study (TLF)



FEW STATES

According to a report by Grand View Research, the global healthcare analytics market is projected to reach USD 84.2 billion by 2027, with a compound annual growth rate (CAGR) of 27.7%. This growth is driven by the increasing need for data-driven insights in the healthcare and pharmaceutical industries.

- A survey conducted by HIMSS Analytics found that 90% of healthcare organizations consider analytics an essential tool for driving their clinical and operational strategies. Effective utilization of analytics tools, such as SAS, is crucial for leveraging data to improve patient outcomes, optimize resource allocation, and drive evidence-based decision-making.

CERTIFICATION, SUPPORT AND JOB ASSISTANCE:

- Earn a recognized certification upon successful completion of the course from Trainer.
- Receive ongoing support and guidance throughout the training journey.
- Access additional resources, study materials,
- Global Job placement assistance.

TRAINING OUTCOME: UPON COMPLETION OF THE TRAINING, PARTICIPANTS CAN EXPECT THE FOLLOWING OUTCOMES:

- **Proficiency in SAS Clinical Data Analysis:** Participants will gain a solid understanding of SAS software and its applications in the pharmaceutical and healthcare industry. They will acquire the skills and knowledge needed to effectively analyze and interpret data related to clinical trials, drug safety, pharmacovigilance, and other critical areas in pharmaceutical and healthcare research.

- **Enhanced Career Prospects:** The training will significantly enhance participants' career prospects in the pharmaceutical and healthcare industry. They will be equipped with sought-after skills that are highly valued by employers, opening doors to diverse job opportunities in pharmaceutical companies, contract research organizations (CROs), regulatory agencies, healthcare analytics firms, and other relevant sectors.

- **Regulatory Compliance and Quality Assurance:** Participants will develop a deep understanding of regulatory requirements and quality assurance practices in the pharmaceutical and healthcare industry. They will learn to ensure compliance with industry regulations and guidelines, enabling them to contribute to the safe and ethical conduct of clinical trials and healthcare data analysis.

- **Practical Application of Skills:** Through hands-on projects and real-world case studies, participants will gain practical experience in applying SAS for data analysis in pharmaceutical and healthcare settings. This practical application will strengthen their analytical capabilities, allowing them to effectively analyze complex datasets, identify trends, and derive meaningful insights to drive evidence-based decision-making.

- **Confident Decision-Making:** The training will empower participants to make confident and informed decisions in the pharmaceutical and healthcare domains. They will develop the ability to analyze clinical data, evaluate safety outcomes, assess drug effectiveness, and contribute to improving patient care and outcomes.

- **Continuous Learning and Professional Growth:** The training will serve as a stepping stone for continuous learning and professional growth in the pharmaceutical and healthcare industry. Participants will have access to additional resources, study materials, and a supportive learning community that will enable them to stay updated with industry advancements and expand their knowledge in this dynamic field.

JOB OPPORTUNITIES:

SAS programmers with expertise in clinical data analysis have various job opportunities within the pharmaceutical and healthcare industry. Some of the common job roles for SAS programmers in the clinical domain include:

- **Clinical SAS Programmer:** This role involves programming and validating SAS code to manage, analyze, and report clinical trial data. Clinical SAS programmers work closely with clinical research teams to ensure data integrity, generate study-specific outputs, and contribute to the development of clinical study reports.

- **Statistical Programmer:** In this role, SAS programmers collaborate with biostatisticians and data management teams to develop and implement statistical analysis plans for clinical trials. They create SAS programs to perform statistical analyses, generate tables, listings, and figures, and support the interpretation and reporting of study results.

- **Clinical Data Analyst:** Clinical data analysts utilize SAS programming skills to clean, transform, and analyze clinical trial data. They are responsible for ensuring the accuracy and completeness of data sets, conducting quality control checks, and generating data summaries and reports for study monitoring and regulatory submissions.

Pharmacovigilance Data Analyst: SAS programmers in pharmacovigilance roles focus on analyzing and processing adverse event data. They use SAS to identify safety signals, perform data mining and analysis to detect adverse drug reactions, and contribute to pharmacovigilance activities and safety reporting.

Clinical Database Programmer: These programmers specialize in designing and programming clinical trial databases using SAS. They develop data structures, implement data validation checks, and create data entry screens and edit checks to support efficient data collection and management throughout the trial.

Clinical Systems Programmer: In this role, SAS programmers work on developing and maintaining the infrastructure and systems used in clinical trials. They design and implement SAS-based solutions for data integration, data transfer, and data warehousing, ensuring smooth and efficient data processing and reporting.

WHY CHOOSE SAS TRAINING WITH US:

- Thousands of students trained and placed globally
- Comprehensive global curriculum
- Industry-relevant focus
- Experienced instructors, min 10 years experience.
- Hands-on learning, practical experience and exercises
- Certification preparation
- Ongoing support
- Job placement assistance
- Flexibility to change batch
- Industry relevant projects.

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