Tech Vision

**SAS Training Course Outline**

**INTRODUCTION TO SAS - 1 session (2 hours)**

NEED FOR SAS

WHO USES SAS

WHAT IS SAS?

OVERVIEW OF BASE SAS SOFTWARE

DATA MANAGEMENT FACILITY

STRUCTURE OF SAS DATASET

PROGRAMMING LANGUAGE

ELEMENTS OF THE SAS LANGUAGE

RULES FOR SAS STATEMENTS

RULES FOR MOST SAS NAMES

SPECIAL RULES FOR VARIABLE NAMES

TYPES OF VARIABLES

DATA ANALYSIS AND REPORTING UTILITIES

TRADITIONAL OUTPUT

WAYS TO RUN SAS PROGRAMS

SAS WINDOWING ENVIRONMENT

NONINTERACTIVE MODE

BATCH MODE

INTERACTIVE LINE MODE

RUNNING PROGRAMS IN THE SAS WINDOWING ENVIRONMENT

**HOW SAS WORKS : 2 session (1.5 hours)**

WRITING YOUR FIRST SAS PROGRAM

A SIMPLE PROGRAM TO READ RAW DATA AND PRODUCE A REPORT

ENHANCING THE PROGRAM

MORE ON COMMENT STATEMENTS

INTERNAL PROCESSING IN SAS

HOW SAS WORKS

THE COMPILATION PHASE

THE EXECUTION PHASE

PROCESSING A DATA STEP: A WALKTHROUGH

CREATING THE INPUT BUFFER AND THE PROGRAM DATA VECTOR

WRITING AN OBSERVATION TO THE SAS DATA SET

FOUR TYPES OF SAS LIBRARIES

SAS LIBRARIES

WORK LIBRARY

SASHELP LIBRARY

SASUSER LIBRARY

**READING RAW DATA INTO SAS : 2 session (2 hours)**

WHAT IS RAW DATA

DEFINITIONS

DATA VALUES

NUMERIC VALUE

CHARACTER VALUE

STANDARD DATA

NONSTANDARD DATA

NUMERIC DATA

CHARACTER DATA

CHOOSING AN INPUT STYLE

LIST INPUT

MODIFIED LIST INPUT

COLUMN INPUT

FORMATTED INPUT

NAMED INPUT

INSTREAM DATA

CREATING MULTIPLE RECORDS FROM SINGLE INPUT ROW

READING DATA FROM EXTERNAL FILES

READING BLANK SEPARATED VALUES (LIST OR FREE FORM DATA):

READING RAW DATA SEPARATED BY COMMAS (.CSV FILES):

READING IN RAW DATA SEPARATED BY TABS (.TXT FILES):

USING INFORMATS WITH LIST INPUT

SUPPLYING AN INFORMAT STATEMENT WITH LIST INPUT

USING LIST INPUT WITH EMBEDDED DELIMITERS

READING RAW DATA THAT ARE ALIGNED IN COLUMNS:

METHOD 1: COLUMN INPUT

METHOD 2: FORMATTED INPUT

USING MORE THAN ONE INPUT STATEMENT: THE SINGLE TRAILING @

READING COLUMN DATA THAT IS ON MORE THAN ONE LINE

MIXED-STYLE INPUT:

INFILE OPTIONS FOR SPECIAL SITUATIONS

**READING DATA FROM A DATASET 2 session (2 hours)**

SET STATEMENT OVERVIEW

AUTOMATIC VARIABLES IN SAS

INTERLEAVE MULTIPLE SAS DATA SETS

COMBINE MULTIPLE SAS DATA SETS

CREATING & MODIFYING VARIABLES

CREATING MULTIPLE DATASETS IN A SINGLE DATA-STEP

SUBSETTING OBSERVATIONS

CONDITIONAL SAS STATEMENTS

LOGICAL AND SPECIAL OPERATORS

THE SAS SUPERVISOR AND THE SET STATEMENT

EFFICIENCY AND THE SET STATEMENT

KNOW YOUR DATA

SET STATEMENT DATA SET OPTIONS

DROP AND KEEP OPTIONS

RENAME OPTION

FIRSTOBS AND OBS OPTIONS

IN OPTION -

WHERE OPTION -

OTHER SET STATEMENT OPTIONS

END OPTION

KEY OPTION

NOBS OPTION

POINT OPTION

DO LOOPS AND THE SET STATEMENT

INTRODUCTION TO RETAIN STATEMENT

CARRY OVER VALUES FROM ONE OBSERVATION TO ANOTHER

COMPARE VALUES ACROSS OBSERVATIONS

ASSIGN INITIAL VALUES

DETERMINING COLUMN ORDER IN OUTPUT DATASET

**READING DATA FROM A DATASET 1 session (2 hours)**

INPUT SAS DATA SET FOR EXAMPLE

SELECTING OBSERVATIONS FOR A NEW SAS DATA SET

DELETING OBSERVATIONS BASED ON A CONDITION

ACCEPTING OBSERVATIONS BASED ON A CONDITION

COMPARING THE DELETE AND SUBSETTING IF STATEMENTS

METHODS OF CREATING NEW DATA SETS WITH A SUBSET

SUBSETTING RECORDS FROM AN EXTERNAL FILE WITH A SUBSETTING IF STATEMENT

SUBSETTING OBSERVATIONS IN A DATA STEP WITH A WHERE STATEMENT

SUBSETTING OBSERVATIONS IN A PROC STEP WITH A WHERE STATEMENT

SUBSETTING OBSERVATIONS IN PROC SQL

DIFFERENCE BETWEEN IF AND WHERE

**SAS INFORMATS AND FORMATS 1 session (2 hours)**

OVERVIEW

USING SAS INFORMATS

INPUT STATEMENT

INPUT FUNCTION

INPUTN AND INPUTC FUNCTIONS

ATTRIB AND INFORMAT STATEMENTS

USING SAS FORMATS

FORMAT STATEMENT IN PROCEDURES

PUT STATEMENT

PUT FUNCTION

PUTN AND PUTC FUNCTIONS

BESTw. Format

ADDITIONAL COMMENTS

**SAS FUNCTIONS 2 session (2 hours)**

CATEGORIES OF FUNCTIONS

SAS CHARACTER FUNCTIONS

FUNCTIONS THAT CHANGE THE CASE OF CHARACTERS

UPCASE

LOWCASE

PROPCASE

FUNCTIONS THAT REMOVE CHARACTERS FROM STRINGS

FUNCTION: COMPBL

FUNCTION: COMPRESS

FUNCTIONS THAT SEARCH FOR CHARACTERS

FUNCTION: ANYALNUM

FUNCTION: ANYALPHA

FUNCTION: ANYDIGIT

FUNCTION: ANYPUNCT

FUNCTION: ANYSPACE

FUNCTION: NOTALNUM

FUNCTION: NOTALPHA

FUNCTION: NOTDIGIT

FUNCTION: NOTUPPER

FUNCTIONS THAT SEARCH STRINGS

FIND AND FINDC

INDEX, INDEXC, AND INDEXW

FUNCTIONS TO VERIFY DATA

FUNCTION VERIFY

FUNCTIONS THAT EXTRACT PARTS OF STRINGS

FUNCTION: SUBSTR (ON THE LEFT-HAND SIDE OF THE EQUAL SIGN)

FUNCTION: SUBSTRN

FUNCTIONS THAT JOIN TWO OR MORE STRINGS TOGETHER

FUNCTION: CAT

FUNCTION: CATS

FUNCTION: CATT

FUNCTION: CATX

FUNCTIONS THAT REMOVE BLANKS FROM STRINGS

FUNCTION: LEFT

FUNCTION: RIGHT

FUNCTION: TRIM

FUNCTION: TRIMN

FUNCTION: STRIP

FUNCTIONS THAT COMPARE STRINGS

FUNCTION: COMPARE

FUNCTIONS THAT DIVIDE STRINGS INTO "WORDS"

FUNCTION: SCAN

FUNCTION: SCANQ

FUNCTIONS THAT SUBSTITUTE LETTERS OR WORDS IN STRINGS

FUNCTION: TRANSLATE

FUNCTION: TRANWRD

FUNCTIONS THAT COMPUTE THE LENGTH OF STRINGS

FUNCTION: LENGTH

FUNCTION: LENGTHC

FUNCTION: LENGTHM

FUNCTION: LENGTHN

FUNCTIONS THAT COUNT THE NUMBER OF LETTERS OR SUBSTRINGS IN A STRING

FUNCTION: COUNT

FUNCTION: COUNTC

MISCELLANEOUS STRING FUNCTIONS

FUNCTION: MISSING

FUNCTION: REPEAT

FUNCTION: REVERSE

SAS DATE AND TIME FUNCTIONS

INTRODUCTION

WHAT IS A SAS DATE AND TIME LITERAL?

DATE AND TIME FUNCTIONS

FUNCTINS TO CREATE DATE AND TIME VALUES

FUNCTIONS TO TAKIE DATETIME VALUES APART

FUNCTIONS TO GET QUARTER ,YEAR OR DAY OF THE DATE

FUNCTIONS THAT WORK WITH INTERVALS

USING FORMATS FOR DATE AND TIME

SYSTEM OPTIONS FORDATE AND TIME

**AN INTRODUCTION TO ARRAYS AND ARRAY PROCESSING 2 session (1.5 hours)**

WHY DO WE NEED ARRAYS?

BASIC ARRAY CONCEPTS

ARRAY STATEMENT

ARRAY REFERENCES

VARIABLE NAME ARRAY REFERENCE

USING ARRAY INDEXES

ONE DIMENSION ARRAYS

MULTI-DIMENSION ARRAYS

TEMPORARY ARRAYS

SORTING ARRAYS

Determining Array Bounds: LBOUND and HBOUND Functions

WHEN TO USE ARRAYS

COMMON ERRORS AND MISUNDERSTANDINGS

INVALID INDEX RANGE

FUNCTION NAME AS AN ARRAY NAME

ARRAY REFERENCED IN MULTIPLE DATA STEPS, BUT DEFINED IN ONLY ONE

**BY - GROUP PROCESSING 2 session (1.5 hours)**

DEFINITIONS FOR BY-GROUP PROCESSING

BY-GROUP PROCESSING

BY VALUE

BY GROUP

FIRST.VARIABLE AND LAST.VARIABLE

MODIFYING SAS DATA SETS: EXAMPLES.

INVOKING BY-GROUP PROCESSING

PREPROCESSING INPUT DATA FOR BY-GROUP PROCESSING

SORTING OBSERVATIONS FOR BY-GROUP PROCESSING

INDEXING FOR BY-GROUP PROCESSING

HOW THE DATA STEP IDENTIFIES BY GROUPS

PROCESSING OBSERVATIONS IN A BY GROUP

HOW SAS DETERMINES FIRST.VARIABLE AND LAST.VARIABLE

PROCESSING BY-GROUPS IN THE DATA STEP

OVERVIEW

PROCESSING BY-GROUPS CONDITIONALLY

DATA NOT IN ALPHABETIC OR NUMERIC ORDER

DATA GROUPED BY FORMATTED VALUES

**OVERVIEW OF METHODS FOR COMBINING SAS DATA SETS 3 session (1.5 hours)**

DEFINITIONS

CONCATENATING

INTERLEAVING

ONE-TO- ONE READING OR ONE-TO-ONE MERGING

MATCH-MERGING

UPDATING

MODIFYING

DEFINITIONS FOR READING, COMBINING, AND MODIFYING SAS DATA SETS

READING A SAS DATA SET

COMBINING SAS DATA SETS

MODIFYING SAS DATA SETS

OVERVIEW OF TOOLS

READING SAS DATA SETS

READING A SINGLE SAS DATA SET

READING FROM MULTIPLE SAS DATA SETS

COMBINING SAS DATA SETS: BASIC CONCEPTS

ONE-TO-ONE

ONE-TO-MANY AND MANY-TO-ONE

MANY-TO-MANY

ACCESS METHODS: SEQUENTIAL VERSUS DIRECT

SEQUENTIAL ACCESS

DIRECT ACCESS

ONE-TO-ONE READING

DATA STEP PROCESSING DURING A ONE-TO-ONE READING

ONE-TO-ONE MERGING

MATCH-MERGING

UPDATING WITH THE UPDATE AND THE MODIFY STATEMENTS :

DEFINITIONS

SYNTAX OF THE UPDATE STATEMENT

SYNTAX OF THE MODIFY STATEMENT -

UPDATING WITH NONMATCHED OBSERVATIONS, MISSING VALUES, AND NEW VARIABLES -

USING AN INDEX WITH THE MODIFY STATEMENT

**SAS PROCEDURES 4 session (1.5 hours)**

INTRODUCTION

THE ANATOMY OF A PROC

THE PROC STATEMENT

TITLE AND FOOTNOTE STATEMENTS

BY STATEMENT

LABEL STATEMENT

FORMAT STATEMENT

RUN OR QUIT STATEMENT

DESCRIPTION OF DATA USED IN REPORTS

SAS REPORTING PROCEDURES

PROCS FOR ALL THAT DETAIL

USING PROC PRINT

USING PROC SQL

PROC REPORT

PROCS THAT SUMMARIZE

USING PROC CHART

USING PROC FREQ

USING PROC MEANS

USING PROC UNIVARIATE

INTRODUCTION TO PROC TABULATE

DATA MANIPULATION AND MANAGEMENT PROCEDURE

PROC SORT

PROC DATASETS

PROC FORMAT

PROC CONTENTS

OTHER IMPORTANT PROCS

PROC TRANSPOSE

DEFINITIONS

PROC PRINTTO

COMPARE PROCEDURE

PROC APPEND

HOW TO IMPORT AN EXCEL FILE INTO SAS

**INTRODUCTION TO PROC SQL 2 session (2 hours)**

INTRODUCTION

WHY LEARN PROC SQL?

SELECT STATEMENT

THE SELECT STATEMENT SYNTAX

A SIMPLE PROC SQL

A COMPLEX PROC SQL

LIMITING INFORMATION ON THE SELECT

CREATING NEW VARIABLES

THE CALCULATED OPTION ON THE SELECT

USING LABELS AND FORMATS

THE CASE EXPRESSION ON THE SELECT

ADDITIONAL SELECT STATEMENT CLAUSES

REMERGING

REMERGING FOR TOTALS

CALCULATING PERCENTAGE

SORTING THE DATA IN PROC SQL

SORT ON NEW COLUMN

SUBSETTING USING THE WHERE

INCORRECT WHERE CLAUSE

WHERE ON COMPUTED COLUMN

SELECTION ON GROUP COLUMN

USE HAVING CLAUSE

CREATING NEW TABLES

JOINING DATASETS USING PROC SQL

INNER JOIN

JOINING THREE OR MORE TABLES

OUTER JOINS

INCLUDING NONMATCHING ROWS WITH THE RIGHT OUTER JOIN

SELECTING ALL ROWS WITH THE FULL OUTER JOIN

CONCATENATING QUERY RESULTS

**AN INTRODUCTION TO SAS MACROS 2 session (2 hours)**

INTRODUCTION

SAS MACRO OVERVIEW

TRADITIONAL SAS PROGRAMMING

THE SAS MACRO LANGUAGE

MACRO LANGUAGE COMPONENTS

MACRO VARIABLES

MACRO STATEMENTS

MACRO PROCESSOR FLOW

AUTOMATIC MACRO VARIABLES

MACRO DEBUGGING OPTIONS

WHAT IS A MACRO?

DEFINING AND USING MACROS

POSITIONAL MACRO PARAMETERS

KEYWORD MACRO PARAMETERS

CONDITIONAL MACRO COMPILATION

THE %DO STATEMENT

SAS DATA STEP INTERFACES

**THE OUTPUT DELIVERY SYSTEM (ODS) 2 session (1.5 hours)**

INTRODUCTION

CREATING VARIOUS TYPES OF REPORTS LISTING OUTPUT

OTHER DESTINATIONS

HTML

PDF AND POSTSCRIPT

RTF FILES

MICROSOFT EXCEL

ADDING STYLE TO YOUR REPORTS

LOCATE EXISTING STYLES

ODS STYLE= OPTION

CUSTOMIZE YOUR REPORTS

ODS SELECT; AND ODS EXCLUDE;

OTHER CUSTOMIZATIONS

ODS PROCLABEL= ;

ODS PROCTITLE; AND ODS NOPROCTITLE;

ADVANCED TECHNIQUES

ODS DOCUMENT

PROC TEMPLATE

**INTRODUCTION TO DIAGNOSING AND AVOIDING ERRORS 1 session (2 hours)**

INTRODUCTION

UNDERSTANDING HOW THE SAS SUPERVISOR CHECKS A JOB

UNDERSTANDING HOW SAS PROCESSES ERRORS

DISTINGUISHING TYPES OF ERRORS .SAS RECOGNIZES FOUR KINDS OF ERRORS:

SYNTAX ERRORS

EXECUTION-TIME ERRORS

DATA ERRORS

SEMANTIC ERRORS

DIAGNOSING ERRORS

DIAGNOSING SYNTAX ERRORS

DIAGNOSING DATA ERRORS

USING A QUALITY CONTROL CHECKLIST

**SAS TUNING AND OBJECTS 1 session (2 hours)**

PERFORMING ADVANCED QUERIES USING PROC SQL

INTRODUCING MACRO VARIABLES

CREATING AND USING MACRO PROGRAMS

STORING MACRO PROGRAMS

CREATING SAMPLES AND INDEXES

USING LOOKUP TABLES TO MATCH DATA

MODIFYING SAS DATA SETS AND TRACKING CHANGES

INTRODUCTION TO EFFICIENT SAS PROGRAMMING

**30 Classes: Estimated date to complete the course outline : 20th Nov 2015**

Doubt class: **2 session (1.5 hours)**

**Days**

**M , T, W, T : SAS**

**Sat, Sun : SAS, VBA**