**Syllabus**

**What is DAX?**

Understanding the data model

Understanding the direction of a relationship

DAX for Excel users

Cells versus tables

Excel and DAX: Two functional languages

Using iterators

DAX requires some theory

Understanding relationship handling

**Introducing DAX**

 Understanding DAX calculations

DAX data types

DAX operators

Understanding calculated columns and measures

Calculated columns

Measures

Variables

Arithmetical operations errors

Intercepting errors

Formatting DAX code

Common DAX functions

Aggregate functions

Logical functions

Information functions

Text functions

Date and time functions

Relational functions

**Using basic table functions**

Introducing table functions

*EVALUATE*syntax

Using table expressions

Understanding *FILTER*

Understanding *ALL*, *ALLEXCEPT*, and *ALLNOBLANKROW*

Understanding *VALUES*and *DISTINCT*

Using *VALUES*as a scalar value

**Understanding evaluation contexts (MOST IMP)**

Introduction to evaluation contexts

Understanding the row context

Testing your evaluation context understanding

Using *SUM*in a calculated column

Using columns in a measure

Creating a row context with iterators

Using the *EARLIER*function

Understanding *FILTER*, *ALL,*and context interactions

Working with many tables

Row contexts and relationships

Filter context and relationships

Introducing *VALUES*

Introducing *ISFILTERED*, *ISCROSSFILTERED*

Evaluation contexts recap

Creating a parameter table

**Understanding CALCULATE and CALCULATETABLE**

Understanding *CALCULATE*

Understanding the filter context

Introducing *CALCULATE*

*CALCULATE*examples

Filtering a single column

Filtering with complex conditions

Using *CALCULATETABLE*

Understanding context transition

Understanding context transition with measures

How many rows are visible after context transition?

Understanding evaluation order of context transition

Variables and evaluation contexts

Understanding circular dependencies

*CALCULATE*rules

Introducing *ALLSELECTED*

Understanding *USERELATIONSHIP*

**DAX examples**

Computing ratios and percentages

Computing cumulative totals

Using ABC (Pareto) classification

Computing sales per day and working day

Computing differences in working days

Computing static moving averages

**Time intelligence calculations**

Introduction to time intelligence

Building a Date table

Using *CALENDAR*and *CALENDARAUTO*

Working with multiple dates

Handling multiple relationships to the Date table

Handling multiple Date tables

Introduction to time intelligence

Using Mark as Date Table

Aggregating and comparing over time

Year-to-date, quarter-to-date, month-to-date

Computing periods from prior periods

Computing difference over previous periods

Computing the moving annual total

Closing balance over time

Semi-additive measures

*OPENINGBALANCE*and *CLOSINGBALANCE*functions

Advanced time intelligence

Understanding periods to date

Understanding *DATEADD*

Understanding *FIRSTDATE*and *LASTDATE*

Understanding *FIRSTNONBLANK*and *LASTNONBLANK*

Using drillthrough with time intelligence

Custom calendars

Custom year-to-date, quarter-to-date, month-to-date

Computing over noncontiguous periods

Custom comparison between periods

**Statistical functions**

Using *RANKX*

Common pitfalls using *RANKX*

Using *RANKEQ*

Computing average and moving average

Computing variance and standard deviation

Computing median and percentiles

Computing interests

Using Excel statistical functions

Sampling by using the *SAMPLE*function

**Advanced table functions**

Understanding *EVALUATE*

Using *VAR*in *EVALUATE*

Understanding filter functions

Using *CALCULATETABLE*

Using *TOPN*

Understanding projection functions

Using *ADDCOLUMNS*

Using *SELECTCOLUMNS*

Using *ROW*

Understanding lineage and relationships

Understanding grouping/joining functions

Using *SUMMARIZE*

Using *SUMMARIZECOLUMNS*

Using *GROUPBY*

Using *ADDMISSINGITEMS*

Using *NATURALINNERJOIN*

Using *NATURALLEFTOUTERJOIN*

Understanding set functions

Using *CROSSJOIN*

Using *UNION*

Using *INTERSECT*

Using *EXCEPT*

Using *GENERATE*, *GENERATEALL*

Understanding utility functions

Using *CONTAINS*

Using *LOOKUPVALUE*

Using *SUBSTITUTEWITHINDEX*

Using *ISONORAFTER*

**Advanced evaluation context**

Understanding *ALLSELECTED*

Understanding *KEEPFILTERS*

Understanding AutoExists

Understanding expanded tables

Difference between table expansion and filtering

Redefining the filter context

Understanding filter context intersection

Understanding filter context overwrite

Understanding arbitrarily shaped filters

Understanding the *ALL*function

Understanding lineage

Using advanced Set Filter

Learning and mastering evaluation contexts

**Handling hierarchies**

Computing percentages over hierarchies

Handling parent-child hierarchies

Handling unary operators

Implementing unary operators by using DAX

**Advanced relationships**

Using calculated physical relationships

Computing multiple-column relationships

Computing static segmentation

Using virtual relationships

Using dynamic segmentation

Many-to-many relationships

Using relationships with different granularities

Differences between physical and virtual relationships

Finding missing relationships

Computing number of products not sold

Computing new and returning customers

Examples of complex relationships

Performing currency conversion

Frequent itemset search

**Optimizing data models**

Gathering information about the data model

Denormalization

Columns cardinality

Handling date and time

Calculated columns

Optimizing complex filters with Boolean calculated columns

Choosing the right columns to store

Optimizing column storage

Column split optimization

Optimizing high cardinality columns

Optimizing drill-through attributes

**Optimizing DAX**

Defining optimization strategy

Identifying a single DAX expression to optimize

Creating a reproduction query

Analyzing server timings and query plan information

Identifying bottlenecks in the storage engine or

formula engine

Optimizing bottlenecks in the storage engine

Choosing *ADDCOLUMNS*vs *SUMMARIZE*

Optimizing filter conditions

Optimizing *IF*conditions

Optimizing cardinality

Optimizing nested iterators

Optimizing bottlenecks in the formula engine