info@vitalextralearning.com,
trainings.vitalextralearning.com
servicedesk@vitalextralearning.com

www.vitalextralearning.com

COURSE OUTLINE

Data Management and Analysis for Scientific Research

Module 1: Data Collection and Management using Open Data Kit (ODK)

INTRODUCTION

ODK or Open Data Kit is a set of free and open source tools that are used for field data collection using android mobile phones (Devices) and allows data submission to an online or cloud server. Data collection is an integral parts of any monitoring and evaluation process and is a key ingredient of informed decision making. Data collection was in the past executed through paper and pen method, which made them prone to error, inconveniences and high costs. Nowadays, instead of collecting data on paper using a pen, data is inputted into a mobile device which is then capable of exporting directly into a centralized database for processing and analysis. Open Data Kit (ODK) is a suite of tools that allows data collection using Android mobile devices and data submission to an online server. This training will equip the participants with skills to author survey questionnaire and manage mobile data collection platform using ODK.

LEARNING OUTCOMES

By the end of this course the participants will be able to:
- Create survey forms using Build and XLSForms
- Set up ODK Build, Collect and Aggregate
- Upload forms to an Aggregate server
- Load forms into Collect on an Android device
- Use ODK Collect to fill out forms with field participants
- Upload survey data from Collect to Aggregate
- Export, manage and analyse data from Aggregate
- Download collected data and manage it for statistical analysis.

TOPICS TO BE COVERED
Session 1: Introduction
Mobile Data gathering
- Benefits of Mobile Applications
- Data and types of Data
- Introduction to common mobile based data collection platforms

info@vitalextralearning.com,
trainings.vitalextralearning.com
servicedesk@vitalextralearning.com

www.vitalextralearning.com

- Managing devices
- Challenges of Data Collection
- Data aggregation, storage and dissemination
- Questionnaire Design

Getting started in ODK
- Types of questions
- Data types for each question
- Types of questionnaire or Form logic
- Extended data types geoid, image and multimedia

Session 2: Survey Authoring and Preparation of mobile phone for data collection
Preparing the mobile phone for data collection
- Installing applications: ODK Collect
  - Using Google play
  - Manual install (.apk files)
- Configuring the device (Mobile Phones)
- Uploading the form into the mobile devices
- Hands-on Exercise

Designing forms and advanced survey authoring
- Introduction to XLS forms syntax
- New data types
- Notes and dates
- Multiple choice Questions
- Multiple Language Support
- Hints and Metadata
- Hands-on Exercise

Session 3: Advanced survey Authoring
- Conditional Survey Branching
  - Required questions
  - Constraining responses
  - Skip: Asking Relevant questions
  - The specify other
- Grouping questions
  - Skipping many questions at once (Skipping a section)
- Repeating a set of questions
- Special formatting
- Making dynamic calculations

info@vitalextralearning.com,
trainings.vitalextralearning.com
servicedesk@vitalextralearning.com

www.vitalextralearning.com

Session 4: Hosting survey data
- Hosting survey data (Online)
- Downloading data

Module 2: Data Management and Statistical Analysis using Microsoft Excel

INTRODUCTION
This training aims at making the process of conversion of "Data" to "Information" efficient and cost effective. This course explore the powers of Microsoft Excel in data science while utilizing at a maximum, the most basic, easily available and affordable data analysis and reporting tool. This training equips participants with technical know-how in data manipulation, statistical analysis, reporting through the use of high-impact, meaningful and appealing reporting solutions (dashboards). After the uptake of this course, most participants often adopt the use of Microsoft Excel in place of specialized software such as SPSS, Stata, R, just to mention a few.

Learning outcomes
By the end of this course the participants will be able to:
- Identify and fix errors in datasets.
- Analyze and better understand their data, and solve complex business and research problems through a user-friendly interface.
- Practically explore statistical concepts such as descriptive statistics and inferential statistics (regression, mean comparisons, test of relationships, time series data analysis, etc).
- Comfortably use simple to advanced data analysis functions in their research and analytics.
- Move from static, dull reports to interactive and insightful dashboards
- Achieve more with advanced analytical charts features in Microsoft Excel

TOPICS TO BE COVERED:
Session 1: Data management in Microsoft Excel
- Computing new variable information
- Protecting data in Microsoft Excel
- Generating variables through calculations
- How to remove unwanted characters in data
- How to compare data
- Finding and searching data in Excel
- Substituting and replacing data in Excel
- Outlining Data
- Sorting data

We THINK
We ANALYSE
We DEVELOP AND DELIVER SOLUTIONS
that satisfy our clients

info@vitalextralearning.com,
trainings.vitalextralearning.com
servicedesk@vitalextralearning.com

www.vitalextralearning.com

- Formatting text data into columns
- Cleaning of data using flash fill
- Detecting and removing duplicate data
- Selecting data that meets a certain criteria

Session 2:
Preparing data for analysis

- How to Create a Structured Reference Table
- Conditional formatting
- What-If Analysis
- Data Validation
- How to consolidate worksheet data
- Importing/Exporting data in/from Excel
- Pivot tables
- Using Excel data form to add, edit and delete records (rows) and display only those records that meet certain criteria.
- Using macros to automate Excel data management tasks
- Using Sparklines in Excel to graph data in cells.

Descriptive Statistics using Microsoft Excel
Measures of Variability and Central Tendency

- Describing quantitative data
- Describing qualitative data

Excel Graphics

- Graphing quantitative data
- Graphing qualitative data

Session 3:
Correlation, Chi-square and mean comparison analysis using Microsoft Excel
Correlation

- Correlation
- Subgroup Correlations
- Scatterplots of Data by Subgroups
- Overlay Scatterplots

Chi-Square

- Goodness of Fit Chi Square All Categories Equal
- Goodness of Fit Chi Square Categories Unequal
- Chi Square for Contingency Tables

info@vitalextralearning.com,
trainings.vitalextralearning.com
servicedesk@vitalextralearning.com

www.vitalextralearning.com

Comparing Means
- Confidence Interval for the Mean
- Test of Hypothesis Concerning the Population Mean
- Difference Between Mean of Two Populations
- One Sample t-tests
- Paired Sample t-tests
- Independent Samples t-tests
- Comparing Means Using One-Way ANOVA

Session 4: Data Analysis (continued)
- Normal Distribution
- Regression Analysis
- Analysing Data in Time and Forecasting

Module 3: Quantitative Data Management, Analysis and Visualization using SPSS

INTRODUCTION
In the socio-economic and business context, conducting research, data management, and data analysis are imperative for informed decision making. IBM SPSS Statistics is a powerful statistical software platform. It delivers a robust set of features that lets your organization extract actionable insights from its data. The software is more popular in social sciences. Sound knowledge about the methodology of conducting research and the use of SPSS is very beneficial for to researchers. Upon completion of workshop, participants will develop competence in quantitative techniques in research design, data collection, and management, statistical data analysis, interpretation and reporting of results.

Learning outcomes
By the end of this course the participants will be able to:
- Easily collect high quality data using mobile devices such as tablets and phones.
- Clean their data for use in subsequent statistical analysis.
- Identify and fix errors in datasets.
- Analyze and better understand their data, and solve complex business and research problems through a user-friendly interface.
- More quickly understand large and complex data sets with advanced statistical procedures that help ensure high accuracy and quality decision-making.
- Gain high level skills on statistical results interpretation and report writing.

TOPICS TO BE COVERED

Session 1:

Statistical Concepts

- Statistical Concepts
- Types of data
- Data Structures and Types of Variables
- Overview of SPSS
- Working with the SPSS software (file management, editing functions, viewing options, etc)
- Output Management
- Basics programming of SPSS

Data Entry/Management

- Entering categorical and continuous data
- Defining and labeling variables
- Validation and Sorting variables
- Transforming, recording and computing variables
- Restructuring data
- Replacing missing values
- Merging files and restructuring
- Splitting files, Selecting cases and weighing cases
- Syntax and output

Session 2:

Statistical Inference and Descriptive Statistics

- Tests of Association
- Tests of Difference
- Hypothesis testing

Measures of Variability and Central Tendency

- Describing quantitative data
- Describing qualitative data

Graphics in Data Analysis

- Graphing quantitative data
- Graphing qualitative data
- Advanced graphics options

Correlation

- Correlation of bivariate data
- Subgroup Correlations
- Scatterplots of Data by Subgroups

We THINK
We ANALYSE
We DEVELOP AND DELIVER SOLUTIONS
that satisfy our clients

info@vitalextralearning.com,
trainings.vitalextralearning.com
servicedesk@vitalextralearning.com

www.vitalextralearning.com

- Overlay Scatterplots

Session 3:
Test statistics and tests of associations
Comparing Means

- One Sample t-tests
- Paired Sample t-tests
- Independent Samples t-tests
- Comparing Means Using One-Way ANOVA

Tests of associations

- Goodness of Fit Chi Square All Categories Equal
- Goodness of Fit Chi Square Categories Unequal
- Chi Square for Contingency Tables
- Pearson Correlation
- Spearman Correlation

Nonparametric Statistics

- Mann-Whitney Test
- Wilcoxon's Matched Pairs Signed-Ranks Test
- Kruskal-Wallis One-Way ANOVA
- Friedman's Rank Test for k Related Samples

Session 4:
Other topics

- Multiple Regression Analysis
- Logistic regression (Binary & Multinomial)
- Cluster Analysis
- Factor analysis

Module 4: Qualitative Data Management and Thematic Analysis using NVivo

Course Description

Most research activities nowadays employ the use of mixed methods that embrace both qualitative and quantitative data. Managing and analyzing qualitative data can be a trying experience. Qualitative data is multifaceted, rich in nature, unstructured and at times can be overwhelming. Qualitative researchers now have the option to apply computer technology in their approach for data management and analysis to ease the complexity of the research process. This course aims to build the capacity of qualitative researchers in qualitative data management and analysis using NVivo software. NVivo is designed for qualitative researchers working with very rich

info@vitalextralearning.com,
trainings.vitalextralearning.com
servicedesk@vitalextralearning.com

www.vitalextralearning.com

text-based and/or multimedia information, where deep levels of analysis on small or large volumes of data are required. The software has many features that can assist to simplify the whole process of doing qualitative research.

Learning outcomes

By the end of this course the participants will be able to:

- Understand qualitative analysis approaches
- Understand different qualitative data collection methods
- Set up a project in NVivo
- Create a framework for qualitative data analysis using NVivo
- Carry out qualitative data analysis using NVIVO
- Write quality reports that arise from qualitative research process.

TOPICS TO BE COVERED
Session 1: Introduction

- What is qualitative data analysis
- Approaches in Qualitative data analysis; deductive and inductive approach
- Points of focus in analysis of text data
- Principles of Qualitative data analysis
- Process of Qualitative data analysis

Introduction to NVivo

- NVivo Key terms
- NVivo interface
- NVivo workspace
- Use of NVivo ribbons

Session 2: Project Management
NVivo Projects

- Creating new projects
- Merging, importing and exporting projects
- Managing projects
- Working with different data sources

Nodes in NVivo

- Theme codes
- Case nodes
- Relationships nodes
- Node matrices

Classifications

- Source classifications

info@vitalextralearning.com,
trainings.vitalextralearning.com
servicedesk@vitalextralearning.com

www.vitalextralearning.com

- Case classifications
- Node classifications

Session 3: Coding, analysis and visualization
Coding
- Data-driven vs theory-driven coding
- Analytic coding
- Descriptive coding
- Thematic coding
- Tree coding

Thematic Analysis using NVivo
- Organize, store and retrieve data
- Cluster sources based on the words they contain
- Text searches and word counts through word frequency queries.
- Examine themes and structure in your content

Memos Annotations and Links
- Linked memos
- Adding annotation to selected content
- See also link

Queries using NVivo
- Queries for textual analysis
- Queries for exploring coding

Visualizing NVivo project
- Display data in charts
- Creating models and graphs to visualize connections
- Tree maps and cluster analysis diagrams

Session 4: Interpretation and reporting
Building on the Analysis
- Content Analysis; Descriptive, interpretative
- Narrative Analysis
- Discourse Analysis
- Grounded Theory
- Framework Analysis

Qualitative Analysis Results Interpretation
- Comparing analysis results with research questions
- Summarizing finding under major categories
- Drawing conclusions and lessons learned

We THINK
We ANALYSE
We DEVELOP AND DELIVER SOLUTIONS
that satisfy our clients

info@vitalextralearning.com,
trainings.vitalextralearning.com
servicedesk@vitalextralearning.com

www.vitalextralearning.com

Qualitative Report Writing
- Qualitative report format
- Reporting qualitative research
- Reporting content
- Interpretation

Module 5: Spatial Data Analysis using ArcGIS

Course Description
A geographical information system (GIS) is a collection of hardware software, and procedures to collect, manage, retrieve, manipulate, analyze and display spatial data. Remote sensing is the acquisition of information about an object or phenomenon without making physical contact with the object and thus in contrast to on-site observation, especially the Earth. This training course will equip participants with handy skills for use in spatial and Earth Observation (EO) as a tool to integrate knowledge about selected phenomena in a meaningful and innovative way.

Learning outcomes
By the end of this course the participants will be able to:
- Install ArcGIS
- Familiarize with dataset types and descriptions in Arc GIS
- Easily explore the ARC MAP interface
- Use GPS data from survey in a comfortable manner
- Map survey data
- Collect data using Mobile data gathering tools
- Integrate GIS within new and existing activities in various fields of study (agriculture, climate change, forestry, food security, etc)

TOPICS TO BE COVERED
Session 1:
Introduction to GPS, GIS and Remote Sensing Principles
- Principles of GIS and Remote Sensing
- Components of GIS Systems
- GIS Capabilities and Functions
- Spatial Data Infrastructure
- Introduction to GPS

info@vitalextralearning.com,
trainings.vitalextralearning.com
servicedesk@vitalextralearning.com

www.vitalextralearning.com

Dataset types and descriptions
- Polygon
- Lines
- Points

Datasets extension description
- .cpg
- .dbf
- .prj
- .shp
- .shx
- .sbn

Data Acquisition: Using Mobile based GPS (ODK)
- Principles and concepts of GPS
- Introduction to Mobile Data gathering
- Getting started
- Survey Authoring
- GIS Mapping ODK collected data
- Online web mapping with Google maps
- Exporting to GIS /RS environment for further analysis
- Hosting the data online

Session 2:
Opening and exploring Arc map interface
- Tools bar
- Table of Contents
- Standard Tool bar
- Menu bar
- Arc Catalog
- Data view
- Layout view
- Refresh
- Coordinates type

Introduction to cartographic visualization and the mapping process
- Components of a map
- Map design
- Symbol design
- Name design and placement
- Concept of scale
- Map projections
- Data pre-processing techniques

info@vitalextralearning.com,
trainings.vitalextralearning.com
servicedesk@vitalextralearning.com

www.vitalextralearning.com

- Thematic mapping;
- Digital mapping

Session 3:
Printing of final map

- Adding a Scale
- Adding a Title
- Adding a Legend
- Adding an insert Map

Querying in GIS

- Query by attribute
- Query by location
- Buffering
- Clipping

Session 4:
More mapping

- Creating quantity maps
- Creating a basemap from the main map
- Customize the Base maps boundary
- Rasters (Landstats)-DOWNLOADING