Ekaagra: Programs Offered

October 2022

Ekaagra: Summary of Offerings

Training-1: Statistics

1. Statistical Foundations of Data Science (SFDS): 5 parts, 15 hr each
2. Design of Experiments (DOE): 3 parts, 15 hr each
3. Statistics for Non Statisticians (SFNS): 2 hr high level program
4. Multi Variate Analysis (MVA): 15 hr
5. Monte Carlo Simulation (MCS) using R: 10 hr

Training-2: Quality and Processes

6. Statistical Quality Control (SQC): 2 parts, 12 hr each
7. Reliability Engineering (REL): 15 hr
8. Seven QC Tools (7QCT): Classical and Modern, 12 hr each
9. Process Mapping (PMAP): 12 hr
10. Problem Solving Tools (PST): 15 hr

Training-3: Other Programs

11. Negotiation Skills (NGTN)
12. Team Building (TB)
13. Communication Skills (CS)
14. Leadership Development (LD)

STATISTICS

Statistical Foundations of Data Science (SFDS) Series

SFDS-01: Basic Statistics with R

15-hr online course via Google Meet, using R and Excel

- **Part-1: Introduction to R**
  - Basic Operations in R – Objects and Functions
  - Graphical Visualization of Data
- **Part-2: Probability and Probability Distributions**
  - Probability: Conditional Probability and Bayes' Theorem
  - Probability Distributions: Binomial, Poisson and Normal
  - Descriptive Statistics: Central Tendency, Dispersion, Skewness and Kurtosis
- **Part-3: Sampling Distributions and Hypothesis Testing**
  - T-Distribution
  - Confidence Intervals
  - Type-I and Type-II errors
  - T-tests and ANOVA
- **Part-4: Hypothesis Testing (cont'd)**
  - Correlation and Regression
  - F-Test and Homogeneity of Variance
  - Chi-Squared
- **Audience: All functions, final yr students across the board, Data Science aspirants**

SFDS-02: Statistical Learning – Basics of Regression

15-hr online course via Google Meet, using R and Excel

- **Part-1: Statistical Learning and Linear Regression**
  - Introduction to Statistical Learning – Supervised and Unsupervised
  - Regression vs Classification
  - Method of Least Squares and Linear Regression
- **Part-2: Linear and Multiple Regression**
  - Model Adequacy for Linear Regression
  - Multiple Regression
  - Handling Qualitative Predictors
- **Part-3: Logistic Regression**
  - Develop Transfer Functions to handle categorical responses
  - Use the above for predictions
- **Audience: Mfg, R&D, Tech Services, Quality, Sales & Mktg, final yr students across the board**
- **Prerequisite: SFDS-01**

SFDS-03: Statistical Learning – Advanced Regression

15-hr online course via Google Meet, using R and Excel.

- **Part-1: Statistical Learning**
  - Quick overview of Linear Regression and Logistic Regression
  - K-Nearest Neighbors
  - Linear Discriminant Analysis
- **Part-2: Resampling Methods**
  - Cross Validation
  - Bootstrap
- **Part-3: Linear Model Selection**
  - Best Subsets for Step wise selection
  - Shrinkage Methods – The Ridge and the Lasso
  - Principal Components Analysis (PCA)
- **Audience: Mfg, R&D, Tech Services, Quality, final yr science and engg students, Data Science aspirants**
- **Prerequisite: SFDS-01 and SFDS-02**

SFDS-04: Statistical Learning – Special Topics

15 hr online course via Google Meet

- **Part-1: Non Linear Regression**
  - Polynomial Regression
  - The Method of Splines
  - Generalized Additive Models (GAM)
- **Part-2: Tree Based Methods**
  - Classification and Regression Trees
  - Bagging and Random Forests
- **Part-3: Support Vector Machines**
  - Maximum Marginal Classifier
  - Support Vector Classifier
- **Part-4: Unsupervised Learning**
  - Principal Components Analysis (PCA)
  - K-Means Clustering
- **Audience: R&D, Quality, Mfg, final yr science and engg students, Data Science aspirants**
- **Prerequisite: SFDS-01 and SFDS-02**

SFDS-05: Time Series Analysis using R

15-hr online course via Google Meet

- Time Series Plots
- Time Series Decomposition
- Forecaster's Toolbox
- Time Series Regression Models
- Time Series Modeling: Exponential Time Smoothing (ETS) incl. Holt-Winters
- Time Series Modeling: ARIMA class of models
- Prediction using above two classes
- Audience: Sales & Mktg, SCM, Business Planning, Projects, Quality, Mfg, final yr students across the board, Data Science aspirants
- Prerequisite: SFDS-01

Design of Experiments (DOE) Series

DOE-01: Basics

- An Overview of the R Programming Language
- A Brief History of Experimental Design
- The One Factor At a Time (OFAT) Approach and its limitations
- The Three Pillars of DOE: Replication, Randomization and Blocking
- Factorial Experimentation: basic concepts
- Fractional Factorials: getting more with less
- Resolution of designs
- Brief Overview of Screening and Response Surfaces
- A/B Testing
- **Duration:** 15-18 hr online or 3 days F2F
- **Audience:** Mfg, R&D, Tech Services, Quality, Sales & Mktg, final yr science and engg students
- **Prerequisite:** SFDS-01

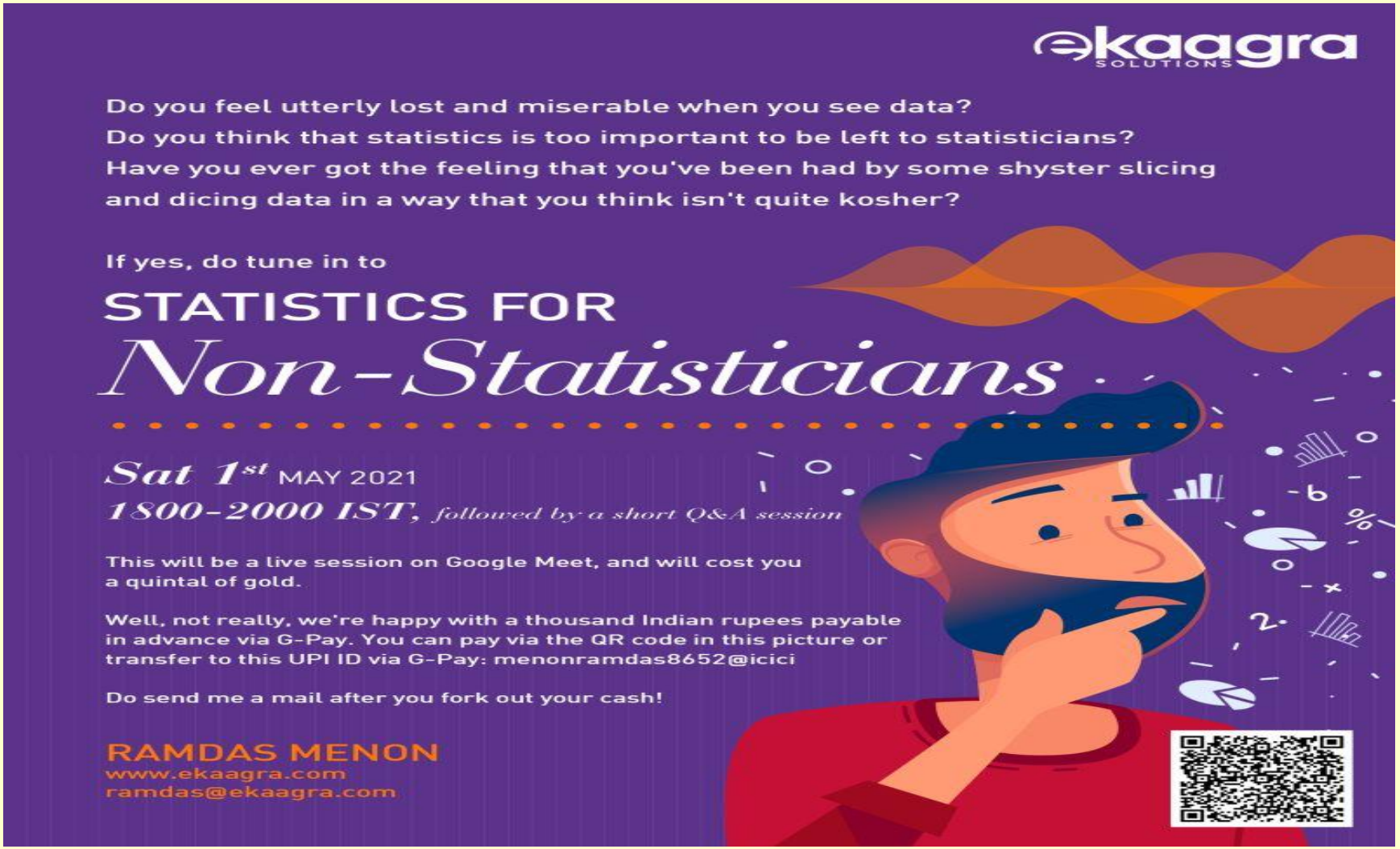
DOE-02: Advanced

- **Response Surface Methods**
  - Box-Wilson
  - Box-Behnken
- **Screening Designs:**
  - Plackett-Burman
  - Taguchi
- **3 level factorials – overview**
- **Taguchi's Robust Designs**
- **Overview of Randomized Complete Block Designs (RCBD-s) and Balanced Incomplete Block Designs (BIBD-s)**
- **Duration : 12-15 hr online or 2 days F2F**
- **Audience: Mfg, R&D, Tech Services, Quality, final yr science and engg students**
- **Prerequisite: DOE-01**

DOE-03: Mixtures

- Mixtures vs Factorial Designs
- Synergism and Antagonism
- Transfer Functions
- Two Component and Three Component Mixtures
- Triangular Diagrams
- Mixture Types:
  - Simplex Lattice
  - Simplex Centroid
  - Extreme Vertices
- Duration : 12-15 hr online or 2 days if F2F
- Audience: R&D, Mfg., Tech Services, Quality – pharma companies especially
- Prerequisite: DOE-01

Statistics For Non Statisticians (SFNS)



Agenda: SFNS

- What is Statistical Thinking?
- Descriptive Statistics: which measures do we use where
- Probability: it's deeper than you think, and in your face!
- Distributions: we forget this all the time
- Confidence Intervals: the MOST interesting concept
- Statistical Inference: the concept of Hypothesis Testing
- The Measurement of Agreement
- Slicing and Dicing: Simpson's Paradox
- Applications of Probability: Simulations
- Duration: 2 hr online public program, delivered once a quarter
- Audience: ANYONE
- Prerequisite: None

Multi Variate Analysis (MVA)

- Descriptive Techniques
- Decomposition of Data Matrices by Factors
- Principal Component Analysis (PCA)
- Factor Analysis
- Cluster Analysis
- Discriminant Analysis
- Correspondence Analysis
- Canonical Correlation Analysis
- Conjoint Measurement Analysis
- Duration: 15-18 hr online or 3 days F2F
- Audience: R&D, Tech Services, Quality, Mfg, Sales & Mktg, final yr students across the board
- Prerequisite: SFDS-01

Monte Carlo Simulation (MCS)

- Quantitative estimation of risks involved in any process
- The range of applicability could range from manufacturing and marketing to financial planning and project management
- Used for predictive modeling, forecasting, simulation and optimization
- We recommend R Programming Language.
- Hands on solutions of your day to day problems can be taken up separately
- Duration: 8-10 hr online or 1 day F2F
- Audience: Sales & Mktg, SCM, Projects, Business Planning, Tech Services, Quality, R&D, final yr students across the board, Data Science aspirants
- Prerequisite: SFDS-01

QUALITY AND PROCESSES

Statistical Quality Control (SQC) Series

SQC-01: Basics

- **Shewhart and his philosophy of control charts**
- **Charts for Continuous Data**
  - X-Bar R and X-Bar S charts
  - I-MR charts
- **Charts for Discrete Data**
  - P and NP charts for defectives – Binomial
  - C and U charts for defects – Poisson
- **Process Capability from Control Charts**
- **Gage Capability Studies**
- **Duration : 12-15 hr online or 2 days F2F**
- **Audience: Quality, Mfg, Tech Services, R&D, final yr students of science and engg**
- **Prerequisite: SFDS-01**

SQC-02: Advanced

- **Quick Revision of Charts for Continuous Data**
- **Quick Revision of Charts for Discrete Data**
- **Other types**
  - Cumulative Sum (Cusum) Charts
  - Exponentially Weighted Moving Average (EWMA) charts
- **Process Capability from control charts**
- **Integrating Engineering Process Control (EPC) with Statistical Process Control**
- **Duration : 12-15 hr online or 2 days F2F**
- **Audience: Quality, Mfg, Tech Services, R&D, final yr students in science and engg**
- **Prerequisite: SQC-01**

Reliability Engineering (REL)

- Basic Terminology such as MTBF, MTTF, MTTR, Hazard rate and Availability
- Distributions: Normal, Exponential, and Weibull
- Statistical Inference
- Probability plotting
- Analysis of Life Data – complete, singly censored and multiply censored
- Reliability Modeling
- Calculation of reliability parameters
- Highly Accelerated Life Testing (HALT)
- Highly Accelerated Stress Screening (HASS)
- Duration : 15-18 hr online or 3 days F2F
- Audience: Mfg, Maintenance, Tech Services, Quality, R&D
- Prerequisite: SFDS-01

Seven QC Tools (7QCT) – Traditional

- **TRADITIONAL**
  - Check Sheet
  - Pareto
  - Cause and Effect (Ishikawa) Diagram
  - Stratification
  - Histogram
  - Scatter Diagram
  - Control Chart
- **Duration: 12-15 hr online or 2 days F2F**
- **Audience: all functions in a company**
- **Prerequisite: None**

Seven QC Tools (7QCT) – Modern

- **MODERN**
  - Affinity Diagram
  - Interrelationship Digraph
  - Tree Diagram
  - Prioritization Matrix
  - Matrix Diagram
  - Process Design Program Chart (PDPC)
  - Activity Network Diagram
- **Duration: 12 hr online or 2 days F2F**
- **Audience: all functions in a company**
- **Prerequisite: None**

Process Mapping (PMAP)

- The rationale for Process Mapping
- SIPOC
- Flow Charting and Process Variables Mapping
- Swim Lanes or Cross Functional Maps
- Value Stream Mapping
- Duration: 12 hr online or 2 days F2F
- Audience: Mfg, Business Planning, Tech Services, Quality, Sales & Mktg, HR and Finance, SCM
- Prerequisite: None

Problem Solving Tools (PST)

- **Root Cause Analysis (RCA)**
- **Failure Modes and Effects Analysis (FMEA)**
- **Solution Generation Techniques**
  - Six Thinking Hats
  - Lateral Thinking
  - Mind Mapping
  - Random Word Technique
- **Solution Evaluation Techniques**
  - Multi Group Voting
  - Nominal Group Technique
  - Delphi Technique
- **Creativity and Innovation**
- **Duration: 15-18 hr online or 3 days F2F**
- **Audience: all functions in a company**
- **Prerequisite: None**

OTHER PROGRAMS

Other Programs

- Negotiation Skills (NGTN)
- Team Building (TB)
- Communication Skills (CS)
- Leadership Development (LD)
- All these programs are scoped out in consultation with the client

Mathematical Foundations of Data Science (MFDS) Series

MFDS: Some Thoughts

- **We will roll this out in the second quarter of 2023**
- **This will cover the following subjects**
  - Linear Algebra
  - Multivariate Calculus
  - Probability
- **Each subject will be covered in 5-6 sessions of 2 to 2.5 hr each**

To Learn More About Us…….

- Ramdas Menon
- +91-98404-58652
- ramdas@ekaagra.com
- www.ekaagra.com