Faysal Aziz

Minitab Advanced Analytics

Optimization, Diagnostics, and Applied Project

FA-0536 · one-day

Data & Analytics

Introduction

This advanced one-day Minitab workshop takes participants well beyond the basics into the kinds of analytical techniques used by experienced engineers, quality analysts, and data scientists. You'll deepen your understanding of design of experiments with response surface methods, critically evaluate regression and ANOVA models, and integrate results into decision-making frameworks.

The course culminates in a **capstone project** where participants apply everything learned to design, analyze, and optimize a real problem using Minitab, reinforcing not just tool usage but interpretation and communication of results — skills essential in industry.

Instructor Experience: The instructor brings **over 30 years of industry experience** and focuses on practical, real-world applications rather than purely academic theory.

Learning outcomes

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

- Design and analyze **Response Surface and other advanced DOE designs** to model curvature and find optimal settings.
- Evaluate and diagnose model fits — including regression diagnostics and checks for ANOVA assumptions.
- Apply **General Linear Models** with interactions, covariates, and factor coding to complex data.
- Conduct **model validation and refinement**, including residual analysis and transformation strategies.
- Integrate analysis steps into a **capstone project** workflow that goes from problem definition to results interpretation and recommendations.

Prerequisites

Participants should have completed an introductory Minitab course or have equivalent experience, including:

- Comfortable creating DOE (full and fractional factorial) and interpreting GLM outputs.
- Familiarity with basic regression and ANOVA analysis.
- Basic data management skills in Minitab.

Training outline

1. 1. Review & Setup

- Course goals and agenda
- Advanced project brief and data sets
- Quick review of Minitab interface and output interpretation

2. 2. Advanced Experimental Design

Response Surface Methodology (RSM)

  - What RSM is and why it's useful for optimization (curvature modeling).
  - Response Surface designs: Central Composite, Box-Behnken
  - Creating and executing RSM designs in Minitab
- Interpreting RSM output, contour and surface plots

3. 3. Model Diagnostics & Validation

Regression diagnostics

  - Residual plots
  - Normality, homoscedasticity, leverage and influence
- ANOVA assumption checks and transformations

4. 4. General Linear Model (GLM) Deep Dive

- Including interaction terms and covariates
- Model comparison and selection
- Using GLM for complex experimental or observational data

5. 5. Optimization & Interpretation

- **Response Optimizer** and numerical search for “best” settings
- Overlaid contour plots for multiple responses
- Practical interpretation and communication of optimized solutions

6. 6. Project Work — Capstone

- **Project introduction:** participants choose or are assigned a dataset/problem
- **Phase 1:** Define goals, select factors and responses
- **Phase 2:** Design experiment or analysis strategy
- **Phase 3:** Conduct analysis (DOE + GLM + diagnostics)
- **Phase 4:** Optimize and interpret results
- **Phase 5:** Prepare brief presentation of findings

7. 7. Presentations & Feedback

- Participants present capstone results
- Instructor critiques based on industrial standards
- Group discussion of insights and alternative approaches

8. 8. Wrap-Up

- Review key takeaways
- Best practices for advanced Minitab workflows
- Resources for further learning (e.g., response surface design resources and statistical modeling references)

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