Here's a detailed **Course Lesson Plan** for **Quality Control and Improvement with MINITAB**:

Course Title:

Quality Control and Improvement with MINITAB

Course Duration:

8 Weeks (Self-paced Online Learning)

Course Lesson Plan

Week 1: Introduction to Quality and Data Visualization with MINITAB

📌 **Topics Covered:**

- Fundamentals of **Quality Control & Improvement**
- **Voice of the Customer (VOC)** and its importance in quality management
- **Kano Model** – Understanding customer needs and expectations
- **Quality Function Deployment (QFD)** – Translating customer needs into product features
- **Data Visualization Techniques using MINITAB**
    - Histogram
    - Boxplot
    - Scatterplot
    - Control Charts

🛠 **Hands-on Practice with MINITAB:**

- Importing data and basic data exploration
- Creating graphical summaries to interpret quality data

Week 2: Root Cause Analysis & Statistical Process Control (SPC) with MINITAB

📌 **Topics Covered:**

- **Pareto Chart** – Identifying key problem areas
- **Cause-and-Effect Diagram (Ishikawa / Fishbone Diagram)**

- **Failure Mode and Effect Analysis (FMEA)** – Risk prioritization
- **Statistical Process Control (SPC) Basics**

🛠 **Hands-on Practice with MINITAB:**

- Creating **Pareto Charts**
- Building **Cause & Effect Diagrams**
- Introduction to Control Charts in MINITAB

Week 3: Control Charts & Process Capability Analysis with MINITAB

📌 **Topics Covered:**

- **Attribute Control Charts** (p-chart, np-chart, c-chart, u-chart)
- **Variable Control Charts** ($\bar{X}$-R, $\bar{X}$-S, I-MR)
- **Process Capability Analysis**
    - Cp, Cpk
    - Pp, Ppk
- **Sigma Level and Process Performance Index (PPI)**

🛠 **Hands-on Practice with MINITAB:**

- Creating Attribute & Variable Control Charts
- Performing Process Capability Analysis

Week 4: Statistical Analysis – Hypothesis Testing & ANOVA with MINITAB

📌 **Topics Covered:**

- **Basic Statistics & Data Normality Checks**
- **Hypothesis Testing Concepts** (p-value, confidence intervals)
- **t-Tests (One-sample, Two-sample, Paired)**
- **ANOVA (Analysis of Variance) – Comparing multiple means**

🛠 **Hands-on Practice with MINITAB:**

- Running t-tests for quality improvement decisions
- Conducting **ANOVA Analysis** to compare process variations

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Week 5: Advanced Statistical Techniques – ANOVA & Regression Analysis

📌 **Topics Covered:**

- **One-way ANOVA** for process comparison
- **Linear Regression** – Understanding relationships between variables
- **Multiple Regression** – Predicting process outcomes

🛠 **Hands-on Practice with MINITAB:**

- Building **regression models** for process improvement
- Applying **ANOVA in decision-making**

Week 6: Regression Analysis & Experimental Design Fundamentals

📌 **Topics Covered:**

- **Multiple Regression (Continued)** – Interaction terms, Model Diagnostics
- **Introduction to Design of Experiments (DOE)**
- **Two-way ANOVA** – Interaction effects of factors on quality

🛠 **Hands-on Practice with MINITAB:**

- Running **two-way ANOVA** for complex comparisons
- Setting up a **basic DOE framework**

Week 7: Measurement System Analysis & Factorial Design of Experiments

📌 **Topics Covered:**

- **Measurement System Analysis (MSA)** – Gage R&R
- **Factorial Design of Experiments (DOE)** – Screening variables

🛠 **Hands-on Practice with MINITAB:**

- Conducting a **Gage R&R Study**
- Running **Factorial Experiments**

Week 8: Advanced Experimental Design & Optimization Techniques

📌 **Topics Covered:**

- **Blocking in Factorial Design** – Controlling nuisance variables
- **Response Surface Methodology (RSM)** – Optimizing quality outcomes
- **Multiple Response Optimization**
- **Fractional Factorial Design** – Efficient experimentation
- **Taguchi Method** – Robust process design

🛠 **Hands-on Practice with MINITAB:**

- Implementing **Fractional Factorial Design**
- Running **Response Surface Optimization**

Final Assessment & Certification:

- **Capstone Project:** Apply MINITAB techniques to solve a real-world quality problem
- **Final Quiz & Certification Exam**

Course Outcomes:

✅ Master **Quality Control & Process Improvement** techniques
✅ Learn **Statistical Analysis & Data-Driven Decision Making**
✅ Gain hands-on experience in **MINITAB for Quality Management**
✅ Improve process efficiency using **DOE, SPC, and Regression Models**
✅ Earn an **Industry-Recognized Certification**
