Course Title: Advanced Problem-Solving & Root Cause Analysis (An Introduction to Six Sigma DMAIC)

- **Duration:** 5 Days (approximately 35-40 instructional hours)
- **Course Goal:** To provide managers, team leaders, and professionals with a rigorous, data-driven framework for solving complex business problems. This course will introduce the core principles and tools of the Six Sigma DMAIC (Define, Measure, Analyze, Improve, Control) methodology, enabling participants to move beyond quick fixes to systematically identify root causes, implement effective solutions, and sustain long-term improvements.
- **Core Focus:** Mastering a structured, five-phase problem-solving methodology inspired by Six Sigma (equivalent to a "Yellow Belt" level of understanding).

Learning Objectives:

Upon successful completion of this workshop, participants will be able to:

- **Define** a business problem clearly and create a problem statement with measurable impact.
- **Apply** the DMAIC framework to structure any complex problem-solving effort.
- **Create** essential project charters and high-level process maps to scope their projects.
- **Utilize** data collection plans to gather meaningful data about a process.
- **Apply** fundamental statistical and graphical analysis tools to measure process performance and identify patterns.
- **Master** root cause analysis techniques like the 5 Whys and Fishbone (Ishikawa) Diagrams to uncover underlying issues.
- **Use** brainstorming and solution-prioritization techniques to select the most effective improvements.
- **Develop** a plan to pilot and implement solutions.
- **Establish** control plans and monitoring systems to sustain the gains and prevent the problem from recurring.
- **Lead** a small-scale process improvement project within their area of responsibility.

Target Audience:

- Managers, Team Leaders, and Supervisors.
- Process Improvement Specialists, Quality Managers, and Operations Analysts.
- Project Managers and Business Analysts.
- Any professional tasked with solving recurring or complex operational problems.

Prerequisites:

- Experience in a professional role and a desire to improve processes.
- Basic proficiency with Microsoft Excel is essential for the data analysis modules.

Teaching Methodology:

This is a highly interactive and application-focused workshop. The methodology includes:

- **Interactive Lectures & Frameworks:** Introducing the DMAIC methodology and its associated tools.
- **Intensive Case Study:** A central, multi-day case study of a realistic business problem (e.g., high customer complaints, long order fulfillment time) will be used to apply the DMAIC tools in each phase.
- **Hands-on Workshops & Data Labs (Excel):** The core of the course. Participants will actively create project charters, map processes, analyze data, and build control charts using provided templates and datasets.
- **Simulations & Group Exercises:** Engaging activities that reinforce key concepts like process variation and root cause analysis.
- **Peer Learning & Presentations:** Groups will present their findings and recommendations at key stages of the DMAIC process.

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Materials Provided:

- Comprehensive digital or printed workbook with key concepts, DMAIC phase guides, and tool explanations.
- A **"Problem-Solver's Toolkit"** with Excel templates for a Project Charter, Process Map, Data Collection Plan, Fishbone Diagram, Pareto Chart, Control Chart, and a Solution Implementation Plan.
- A detailed case study with supporting process documents and datasets.
- Certificate of Completion (often referred to as equivalent to "Yellow Belt" training).

Detailed Day-by-Day Curriculum

Day 1: The "Define" Phase – Scoping the Problem

- **Module 1: Introduction to Structured Problem-Solving & Six Sigma (Approx. 2 hours)**
  - Welcome, introductions, and course objectives.
  - The cost of "firefighting" vs. the value of structured problem-solving.
  - What is Six Sigma? A philosophy and a methodology for process improvement.
  - Introduction to the **DMAIC** (Define, Measure, Analyze, Improve, Control) framework as our roadmap.
- **Module 2: The "Define" Phase: What Problem Are We Solving? (Approx. 2.5 hours)**
  - The importance of a clear and focused problem statement.
  - Defining the business impact ("the pain") in quantifiable terms.
  - Identifying key stakeholders and the Voice of the Customer (VOC).
  - Setting clear project goals and objectives.
- **Module 3: The Project Charter: Your Project's Constitution (Approx. 3 hours)**
  - The purpose and key elements of a Project Charter:
    - Problem Statement
    - Business Case
    - Goal Statement (SMART)
    - Project Scope (In-Scope/Out-of-Scope)
    - Team Members & Roles
    - Timeline (Milestones)
  - **Intensive Workshop:** Participants work in teams to create a complete Project Charter for the course case study.
  - **End of Day 1 Recap & Q&A.**

Day 2: The "Measure" Phase – Understanding the Current State

- **Module 4: Process Mapping & Analysis (Approx. 2.5 hours)**
  - "You can't improve what you don't understand."
  - Creating high-level SIPOC maps (Suppliers, Inputs, Process, Outputs, Customers).
  - Developing detailed process maps (flowcharts, swimlane diagrams).
  - Identifying value-added vs. non-value-added steps.
  - **Workshop:** Participants create a detailed swimlane process map for the case study problem.
- **Module 5: Data Collection & Measurement System Analysis (Approx. 3 hours)**
  - Defining what to measure: Identifying key process metrics (KPIs).
  - Developing a Data Collection Plan.
  - Introduction to Measurement System Analysis (MSA): Is your data trustworthy? (Conceptual overview of accuracy, precision, stability).
- **Module 6: Basic Statistics & Measuring Process Performance (Approx. 2 hours)**

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- Descriptive statistics recap (mean, median, standard deviation).
- Understanding process variation as the enemy.
- Introduction to Process Capability (Cp, Cpk) – a measure of how well your process meets customer specifications.
- **Hands-on Lab (Excel):** Calculating basic descriptive statistics and creating histograms for the case study data.
- **End of Day 2 Recap & Q&A.**

Day 3: The "Analyze" Phase – Finding the Root Cause

- **Module 7: Graphical Analysis for Problem-Solving (Approx. 3 hours)**
  - Using data visualization to identify patterns and potential causes.
  - **Pareto Charts:** Applying the 80/20 rule to focus on the "vital few" causes.
  - **Trend Charts (Run Charts):** Visualizing process performance over time.
  - **Scatter Plots:** Investigating relationships between variables.
  - **Hands-on Lab (Excel):** Participants create Pareto charts and trend charts for the case study data to narrow down the problem.
- **Module 8: Deep Dive into Root Cause Analysis (RCA) (Approx. 4 hours)**
  - The importance of moving beyond symptoms.
  - **The 5 Whys:** A simple but powerful technique for drilling down to the root cause.
  - **Fishbone (Ishikawa) Diagram:** A structured brainstorming tool to explore all potential causes (categorized by Man, Machine, Method, Material, Measurement, Environment).
  - **Intensive Workshop:** Participants facilitate a Fishbone Diagram session for the case study problem, then use the 5 Whys on the most likely causes.
  - **End of Day 3 Recap & Q&A.**

Day 4: The "Improve" Phase – From Cause to Solution

- **Module 9: Generating & Selecting Solutions (Approx. 3.5 hours)**
  - Brainstorming techniques to generate a wide range of potential solutions for the identified root causes.
  - Moving from ideas to viable solutions.
  - **Solution Selection Matrix:** A structured tool for evaluating and prioritizing solutions based on criteria like effectiveness, cost, and ease of implementation.
  - **Workshop:** Participants brainstorm solutions for the case study's root causes and then use a selection matrix to choose the best ones.
- **Module 10: Introduction to Lean Concepts for Improvement (Approx. 2 hours)**
  - The concept of "Waste" (Muda) in processes (Defects, Overproduction, Waiting, Non-utilized Talent, Transportation, Inventory, Motion, Extra-processing - DOWNTIME).
  - Using Lean principles to design more efficient "to-be" processes.
- **Module 11: Piloting & Implementing Solutions (Approx. 2 hours)**
  - The importance of piloting a solution on a small scale before a full rollout.
  - Developing a Pilot Plan.
  - Creating a high-level Implementation Plan: What, Who, When.
  - The role of change management in ensuring the solution is adopted.
  - **End of Day 4 Recap & Q&A.**

Day 5: The "Control" Phase & Your Action Plan

- **Module 12: The "Control" Phase: Sustaining the Gains (Approx. 3 hours)**
  - Why improvements often fade over time without a control plan.
  - Key elements of a Control Plan:
    - Documenting the new process (e.g., updated SOPs, checklists).

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        - Training staff on the new process.
        - Implementing a monitoring system.
    - **Introduction to Statistical Process Control (SPC) Charts:** Using control charts to monitor process performance and detect when it goes "out of control."
    - **Hands-on Lab (Excel):** Participants create a simple control chart for a key metric in the case study.
- **Module 13: Finalizing the Project & Communicating Results (Approx. 2 hours)**
    - Calculating the financial and operational benefits of the improvement project.
    - The importance of closing out the project formally.
    - Crafting a compelling summary presentation to communicate the project's success to leadership.
- **Module 14: Capstone Project Presentations (Approx. 2 hours)**
    - **Final Presentation:** Teams present their complete DMAIC journey for the case study.
    - They will walk through their Project Charter, process maps, data analysis, root cause findings, proposed solution, and control plan.
- **Module 15: Your Advanced Problem-Solving Action Plan (Approx. 1 hour)**
    - **Action Planning:** Participants identify a real-world problem in their work area and outline the first steps of applying the DMAIC framework to it.
    - Course Review, Final Q&A, and closing.
    - Course evaluation.

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