Okay, here are detailed training plans for each of the five modules, based on the structure and timings outlined in the ADDIE implementation process.

These plans incorporate the principles of adult learning, focusing on hands-on activities and relevance to manufacturing engineering tasks.

## AI Training Module Plans for Manufacturing Engineers

This document provides detailed plans for each of the five training modules, designed to equip manufacturing engineers with practical AI skills for information organization and data utilization.

### Module 1: Information Leverage Foundations

* **Objective:** Understand the potential of basic AI tools for improving personal and team information management and identify current pain points solvable by AI.
* **Duration:** 60 minutes
* **Topics Covered:**
  + Introduction to accessible AI tools (brief overview of capabilities - e.g., large language models, conversational AI).
  + Defining "Information Overload" and "Data Silos" in a manufacturing engineering context.
  + Illustrative examples of AI application in engineering workflows (e.g., quickly finding information in manuals, summarizing technical documents).
  + Ethical considerations and data privacy basics when using AI tools with company information.
* **Activities/Exercises:**
  + **Group Discussion (15 min):** "What are your biggest challenges with finding, organizing, or using technical information today?" (Facilitator captures key pain points).
  + **Poll/Voting (10 min):** Rank the top 3 pain points identified that AI *might* help with.
  + **Mini Case Study Review (15 min):** Present 2-3 anonymized, relatable manufacturing scenarios where finding or summarizing information is critical but difficult. Discuss how an AI assistant *could* potentially help (e.g., finding a specific spec in a large PDF manual, summarizing maintenance logs).
  + **Q&A and Module Wrap-up (20 min):** Clarify concepts, address concerns about AI in the workplace, and set expectations for the rest of the training.
* **Materials:**
  + Presentation slides (Introduction, AI concept overview, Pain points, Case Studies, Ethics).
  + Whiteboard or flip chart for capturing discussion points.
  + Handout: "Introduction to AI for Engineers - Key Concepts".
* **Assessment:**
  + Informal observation of participation in discussion.
  + Understanding gauged through Q&A.
* **Connection to Manufacturing Context:** Directly addresses engineers' daily struggles with technical documentation, standards, and internal reports.

### Module 2: Prompting for Engineers - Getting Useful Responses

* **Objective:** Learn fundamental and advanced prompting techniques to obtain accurate, relevant, and structured information from AI conversational tools (e.g., ChatGPT, Perplexity AI).
* **Duration:** 180 minutes (Part 1: Fundamentals 90 min, Part 2: Advanced 90 min)
* **Topics Covered:**
  + **Part 1: Fundamentals (90 min)**
    - What is a "prompt"? Anatomy of an effective prompt.
    - Keywords, clarity, and specificity.
    - Defining the AI's "role" (e.g., "Act as a manufacturing process expert").
    - Iterative prompting: refining requests based on initial responses.
    - Basic prompt patterns for engineering tasks (e.g., "Explain X concept simply," "Compare Y and Z technologies").
  + **Part 2: Advanced & Engineering-Specific (90 min)**
    - Providing context and constraints in prompts.
    - Requesting specific output formats (e.g., bullet points, tables, code snippets for analysis).
    - Using negative constraints ("Do not include...").
    - Prompting for troubleshooting steps.
    - Prompting for potential causes of failure based on symptoms.
    - Generating drafts for technical communications (emails, reports - emphasizing review).
    - Prompting for code explanations or simple script generation (e.g., Python for data parsing - again, emphasizing review and testing).
* **Activities/Exercises:**
  + **Demonstration (15 min total over parts):** Facilitator demonstrates prompting principles live using an AI tool.
  + **Guided Practice 1 (30 min Part 1):** Participants follow along with simple, structured prompts related to general technical concepts.
  + **Paired Practice (45 min Part 1):** Participants work in pairs to practice prompting each other on provided simple engineering scenarios (e.g., explaining a manufacturing term, summarizing a common process step). Share and discuss results.
  + **Guided Practice 2 (40 min Part 2):** Participants work individually on more complex engineering-specific prompts provided by the facilitator (e.g., asking for potential causes of a specific machine fault code, requesting a draft email to a vendor about a technical issue).
  + **Applied Exercise (50 min Part 2):** Participants use an AI tool to tackle a small, pre-defined task relevant to their work using advanced prompting (e.g., outline steps for a common maintenance procedure, draft talking points for a technical update). Share and discuss results and prompting strategies.
  + **Q&A and Prompting Best Practices Review (15 min total over parts):** Discuss common prompting pitfalls and tips.
* **Materials:**
  + Laptops for each participant with internet access.
  + Accounts for chosen AI tools (ChatGPT, Perplexity AI, etc.).
  + Presentation slides on Prompting Fundamentals and Advanced Techniques.
  + Handout: "Effective Prompting Guide for Engineers".
  + Worksheet with structured prompting exercises and engineering scenarios.
* **Assessment:**
  + Observation of participants' prompting during guided and paired practice.
  + Review of outputs from applied exercises (qualitative assessment).
  + Facilitator feedback during activities.
* **Connection to Manufacturing Context:** Directly applicable skill for interacting with AI to get specific technical information, troubleshoot issues, and draft communications related to their daily tasks.

### Module 3: Knowledge Organization with AI

* **Objective:** Learn how to use AI tools (specifically NotebookLM or similar document-aware AIs) to organize, summarize, and extract information from technical documents.
* **Duration:** 120 minutes
* **Topics Covered:**
  + Introduction to document-based AI tools (e.g., NotebookLM, capabilities, and limitations).
  + Uploading and managing source documents (manuals, specifications, reports).
  + Asking questions about uploaded documents.
  + Generating summaries and key takeaways from documents.
  + Finding relationships and connections between multiple documents.
  + Creating structured notes and outlines based on document content.
  + Potential applications for standard operating procedures (SOPs), maintenance logs, technical specifications, and project documentation.
* **Activities/Exercises:**
  + **Demonstration (20 min):** Facilitator demonstrates uploading a set of sample manufacturing documents (e.g., equipment manual, troubleshooting guide, safety protocol) into NotebookLM and performing basic tasks like asking questions, summarizing sections, and finding specific information.
  + **Guided Practice (40 min):** Participants upload a smaller set of provided sanitized documents (e.g., excerpts from a machine manual, a recent quality report). Facilitator guides them through asking specific questions about the documents and generating summaries of sections.
  + **Applied Exercise (45 min):** Participants work individually or in pairs with a slightly larger set of sanitized documents related to a specific manufacturing process or piece of equipment. Their task is to use NotebookLM to answer a set of pre-defined questions that require synthesizing information from multiple documents (e.g., "What are the steps for replacing component X according to documents A and B? What safety precautions are mentioned in document C related to this process?"). Participants share their process and findings.
  + **Discussion & Application Ideas (15 min):** Discuss how participants could apply this to their own work documents. Share ideas for organizing project notes, research, or historical data.
* **Materials:**
  + Laptops for each participant with internet access.
  + Accounts for NotebookLM or similar tool.
  + Set of sanitized manufacturing documents for exercises (digital files).
  + Presentation slides on document-based AI tools.
  + Worksheet with guided practice steps and applied exercise questions.
* **Assessment:**
  + Observation of participants navigating the tool and completing tasks.
  + Review of answers derived from the applied exercise.
  + Participation in discussion on application ideas.
* **Connection to Manufacturing Context:** Directly addresses the challenge of managing and quickly accessing information within vast amounts of technical documentation crucial for their roles.

### Module 4: AI for Data Handling and Basic Analysis

* **Objective:** Learn how AI tools can assist in standardizing data formats, cleaning simple datasets, and performing basic data analysis tasks relevant to manufacturing (e.g., identifying trends in maintenance data, summarizing production metrics).
* **Duration:** 180 minutes (Part 1: Data Handling 90 min, Part 2: Basic Analysis 90 min)
* **Topics Covered:**
  + **Part 1: Data Handling (90 min)**
    - Common data challenges in manufacturing (inconsistent formats, missing values, disparate sources).
    - Using AI to understand data structure and identify inconsistencies.
    - Prompting AI to suggest data standardization rules.
    - Using AI within spreadsheet tools (if available, e.g., Google Sheets AI features, Excel Copilot potential) or standalone AI tools to assist in data cleaning tasks (e.g., reformatting dates, standardizing units).
    - Using AI to generate simple data entry templates.
  + **Part 2: Basic Analysis (90 min)**
    - Asking AI to summarize key statistics from a small dataset (e.g., average downtime, production count range).
    - Prompting AI to identify basic trends or anomalies (e.g., "Are there any patterns in equipment failures related to operating hours?").
    - Using AI to generate simple charts or suggest visualization types (if the tool supports it).
    - Asking AI to explain the meaning of data points or columns.
    - Limitations of AI for complex statistical analysis or critical decision-making (emphasize human oversight).
* **Activities/Exercises:**
  + **Demonstration (20 min total over parts):** Facilitator demonstrates using an AI tool or spreadsheet with AI features to inspect a sample dataset, identify potential issues, and perform a simple summary.
  + **Guided Practice 1 (35 min Part 1):** Participants work with a small, slightly messy sample dataset (e.g., simulated maintenance log with inconsistent date formats, varied equipment names). Use AI to identify issues and suggest standardization rules. Apply simple cleaning steps using AI assistance if available, or manually based on AI suggestions.
  + **Applied Exercise (35 min Part 1):** Participants work with a new small dataset. Their task is to use AI to help create a plan for standardizing and cleaning the data, or use AI features within a spreadsheet to perform specific cleaning tasks.
  + **Guided Practice 2 (40 min Part 2):** Participants use a cleaned sample dataset (or the one they cleaned in Part 1). Use AI to answer basic questions about the data (e.g., "What is the total production for Machine A?", "Find the average time between failures for component Y").
  + **Applied Exercise (40 min Part 2):** Participants work with a different dataset (e.g., energy consumption vs. production output). Use AI to identify basic relationships or trends and summarize findings. Prompt the AI to suggest a suitable chart type.
  + **Discussion & Limitations (10 min total over parts):** Discuss the types of data tasks AI is good for and when human expertise and specialized tools are still necessary.
* **Materials:**
  + Laptops for each participant with internet access.
  + Access to chosen AI tools (ChatGPT, Perplexity AI, or AI features in Google Sheets/Excel if applicable).
  + Sample sanitized manufacturing datasets (spreadsheets/CSV files).
  + Presentation slides on Data Handling and Basic Analysis with AI.
  + Worksheet with datasets and exercise instructions.
* **Assessment:**
  + Observation of participants' interaction with data and AI.
  + Review of cleaning steps and analysis summaries from exercises.
  + Participation in discussions about AI limitations in data analysis.
* **Connection to Manufacturing Context:** Directly addresses the need to work with manufacturing data (maintenance, quality, production) to gain insights, even with basic tools.

### Module 5: Integrated Application & Future Steps

* **Objective:** Synthesize skills learned in previous modules by applying AI tools to a more complex, multi-step engineering scenario and plan for applying AI in their daily work.
* **Duration:** 60 minutes (Followed by 90 min Implementation Planning)
* **Topics Covered:**
  + Review of Modules 1-4 key concepts.
  + Case study requiring integrated application of prompting, knowledge organization, and data insights.
  + Identifying opportunities for AI application in participants' specific roles.
  + Best practices for responsible AI use in the workplace.
  + Introduction to the Implementation Planning session.
* **Activities/Exercises:**
  + **Recap & Q&A (15 min):** Quick review of previous modules and open floor for questions.
  + **Integrated Case Study (30 min):** Present a realistic manufacturing engineering challenge (e.g., investigate a recurring product defect involving multiple machines, operators, and material batches). Participants, working individually or in small groups, use the provided sanitized documents (Module 3 style) and dataset (Module 4 style) with AI tools (Module 2 prompting) to:
    - Quickly find relevant information in documentation.
    - Summarize findings from different sources.
    - Analyze the small dataset for potential correlations.
    - Draft a summary of potential causes or next steps using AI prompting.
    - (Note: This is a time-boxed simulation, not a full investigation).
  + **Case Study Debrief (10 min):** Discuss approaches, challenges, and successes during the case study. Highlight how combining the tools was necessary.
  + **Module Wrap-up & Transition (5 min):** Briefly summarize the power of integrated AI use and transition to the Implementation Planning session.
* **Materials:**
  + Laptops, AI tool access, and access to documents/datasets from previous modules.
  + Case study description handout with objectives.
  + Presentation slides for recap and case study introduction.
* **Assessment:**
  + Observation of participants attempting the integrated case study.
  + Qualitative review of outputs from the case study exercise (focus on *process* and *attempted integration* rather than a perfect solution).
* **Connection to Manufacturing Context:** Provides a realistic simulation requiring participants to combine the learned skills, mirroring the multi-faceted nature of real engineering problem-solving.

**Following Module 5:** The dedicated **Implementation Planning (90 min)** session, as outlined in the ADDIE Phase 4, would then guide participants in developing their personal action plans for using AI in their specific job tasks, identifying resources, and planning next steps for integration into their workflow. This is a critical transition from learning to application.