AI+ Supply Chain™ (1 Day)

Program Detailed Curriculum

Executive Summary

AI + Supply Chain course provides a thorough examination of how Artificial Intelligence (AI) is changing supply chain management, covering basic concepts up to advanced uses. It includes key subjects like AI methods for improving supply chains, the impact of generative AI on developing strategies, and the digitalization of supply chain operations. The course also delves into decision-making guided by AI, applications specific to various industries, and the incorporation of AI into managing logistics. The last module offers a practical workshop where participants can utilize AI concepts for actual supply chain problems, getting them ready to spearhead AI-based advancements in their companies.

Course Prerequisites

- Foundational knowledge of supply chain concepts, processes, and operations.

- A general understanding of Artificial Intelligence, including machine learning and data analytics, is recommended.

- Prior experience with business management or technical tools, such as ERP systems or data analysis software, will be beneficial.

- Strong analytical and problem-solving skills are essential to understand and apply AI-driven techniques in supply chain scenarios.

Module 1

Introduction to Artificial Intelligence in Supply Chain

1.1 Overview of Artificial Intelligence in Supply Chain Management (SCM)

- **Introduction to AI in Supply Chain Management:** Definition and components of a supply chain, Key processes in SCM: procurement, production, distribution, and logistics.

- **AI Driven Supply Chain Networks:** Upstream and downstream flows, Importance of SCM in modern businesses.

- **Challenges in Traditional Supply Chains:** Common Challenges - demand forecasting, inventory management, and supplier management, Impact of globalization and e-commerce on supply chains, Case studies: Examples of supply chain disruptions and inefficiencies.

1.2 Transforming Supply Chains with AI

- **AI Transformation with Supply Chains:** Automation, Optimization, and Predictive Analytics, AI applications in demand forecasting, inventory management, and logistics.

- **AI-driven Supply Chain Optimization:** AI techniques for supply chain optimization - Machine learning models, neural networks, and reinforcement learning, Real-time data analytics and decision-making in supply chains, Exploring AI's role in enhancing supply chain agility and resilience.

- **Future possibilities of AI in SCM:** Case Studies - Successful AI implementations in SCM (e.g., Amazon, Walmart).

1.3 Ethical Implications of AI in Supply Chains

- **Ethical and Practical Considerations in AI-driven SCM:** Ethical challenges - data privacy, bias in AI algorithms, and decision transparency, Regulatory considerations - GDPR, data protection laws, and compliance issues, Responsible AI, Principles for ethical AI implementation in SCM.

- **Practical Challenges in Implementing AI in SCM:** Barriers to AI adoption- technical, organizational, and cultural barriers, Best practices for overcoming challenges - Change management, upskilling, and stakeholder engagement, Future trends and the evolving landscape of AI in SCM.

Module 2

Advanced AI Techniques for Supply Chain

2.1 Basic Concepts and Principles of AI

- **Introduction to Machine Learning in SCM:** Overview of machine learning (ML) and its role in supply chain management, Types of ML algorithms - supervised, unsupervised, and reinforcement learning, Key applications in SCM - Demand forecasting, Inventory management, and Logistics optimization.

- **Classical AI Approaches in Supply Chain:** Introduction to classical AI - Rule-based systems, Expert systems, and Decision trees, Comparing classical AI with modern AI techniques like machine learning and deep learning.

2.2 Expert Systems in SCM

- **Understanding expert systems:** Knowledge representation, inference engines, and rule-based reasoning, Challenges and limitations of classical AI in dynamic supply chains, Using decision trees and rule-based logic to simulate supply chain scenarios.

- **Developing a Rule-Based System:** Creating a rule-based system for order processing or inventory management, implementing expert systems for supplier selection and procurement management.

2.3 Integrating Images and Text in Supply Chain AI

- **AI Techniques for Image and Text Processing:** Introduction to computer vision and natural language processing (NLP) in supply chains, Applications of image processing - Quality control, Warehouse automation, and Visual inspections, Applications of NLP - Demand sensing, Contract analysis, and Sentiment analysis.

- **Image and Text Analysis:** Using image classification for automated quality control in manufacturing, Building a simple image classification model for defect detection, integrating multimodal AI (images and text) for comprehensive supply chain insights.

Module 3

Generative AI in Supply Chain Management

3.1 The Origin of Generative AI

- **Introduction to Generative AI:** Definition and key concepts: Generative models, discriminative models, Historical background - From early AI models to the rise of generative approaches, Types of generative models: Variational Autoencoders (VAEs), Generative Adversarial Networks (GANs), and diffusion models.

- **Applications of Generative AI in Supply Chain Management:** How generative AI can be used for supply chain design, optimization, and simulation? Generative AI in Inventory Management and Logistics, Techniques for generating demand and supply scenarios using generative models, Applications in inventory replenishment, route optimization, and warehouse management.

3.2 Generative AI in Revenue Management and Demand Forecasting

- **Revenue Management with Generative AI:** Revenue management principles and how generative AI can enhance them, How generative AI is used by companies to optimize pricing strategies?

- **Demand Forecasting using Generative AI:** Techniques for improving demand forecasting accuracy using generative models, Integration of generative AI with traditional forecasting methods, Applications in retail, manufacturing, and distribution for predicting demand fluctuations

3.3 Transformer and LSTM Architectures in Generative AI

- **Understanding Transformer Architectures:** Introduction to Transformers - Self-attention mechanism, encoder-decoder architecture, and positional encoding, Applications of Transformers in text generation, translation, and sequence modelling, How Transformers revolutionized NLP and its impact on supply chain applications.

- **LSTM Architectures and Their Role in Generative AI:** Overview of Long Short-Term Memory (LSTM) networks, Gates, Memory cells, and Sequence processing, Comparison between LSTM and Transformer architectures for sequential data.

Module 4

Supply Chain Digitization

4.1 Introduction to Supply Chain Digitization

- **Overview of digitization in supply chain management:** The role of digital technologies - AI, IoT, blockchain, and big data, Key objectives - Efficiency, transparency, and agility in supply chains, Evolution of Digital Supply Chains, Historical context - From traditional to digital supply chains, The impact of Industry 4.0 on supply chain digitization, Leading companies in supply chain digitization.

- **Data Science and AI to Improve Business Decisions:** Role of data science in supply chain decision-making, Data analytics techniques - Descriptive, predictive, and prescriptive analytics.

4.2 Supply Chain Integration and Push-Pull Strategies

- **Supply Chain Integration:** Importance of integration across the supply chain - Vertical and horizontal integration, Collaborative planning, forecasting, and replenishment (CPFR), Integration technologies - EDI, Cloud Computing, and Collaborative platforms.

- **Push-Pull Strategies in Supply Chains:** Understanding push and pull strategies - Definitions and Differences, Hybrid push-pull models, Advantages and challenges of push-pull models.

4.3 Supply Chain Resiliency, Planning and Sustainability

- **Building Resilient Supply Chains and Planning in Digital Age:** Definition and importance of supply chain resiliency, Strategies for enhancing resiliency - Risk assessment, diversification, and contingency planning, Technologies supporting resiliency - AI-driven risk management, digital twins, and scenario planning.

- **Supply Chain Planning in the Digital Age:** Overview of supply chain planning, Role of AI and advanced analytics in improving planning accuracy.

- **Supply Chain Sustainability:** Importance of Sustainability in Supply Chains, Overview of sustainability challenges in global supply chains, Environmental, social, and governance (ESG) considerations, Sustainable supply chain practices, Digital Technologies for Supply Chain Sustainability.

Module 5

Intelligent Driven Supply Chain Management

5.1 Introduction to Smart SCM

- **Intelligence in SCM:** Overview of smart systems and its relevance to supply chain management, Key technologies - Machine Learning, Natural Language Processing, Computer Vision, and Robotics in SCM, Applications: Demand forecasting, Inventory optimization, Supplier risk assessment.

- **Principles of Supply Chain Management:** Ideologies of smart supply chain management concepts, Key principles - Supply Chain Integration, Push-Pull Strategies, Complexity Reduction, Supply Chain Segmentation, The role of information flow, physical flow, and financial flow in SCM.

5.2 Employing Smart SCM and Prompt Engineering

- **Implementing AI in Supply Chain Management:** Steps to integrate AI into existing supply chain systems, Challenges and solutions - Data quality, system integration, change management, Case studies: Successful AI implementation in supply chains.

- **Prompt Engineering in SCM:** Introduction to prompt engineering, Importance of Prompt Engineering in AI models, How to craft effective prompts for various AI applications, Role of prompt engineering in SCM-related AI applications, Strategies for effective prompt design specific to SCM tasks, Types of Prompting - Zero-shot, few-shot, and fine-tuned prompting.

5.3 Future Trends of Smart SCM

- **AI, 5G, and the Smart Supply Chain:** How AI is driving the future of supply chain management? The role of 5G in enabling real-time data exchange and IoT integration, Vision for the smart supply chain with respect to Autonomous operations, AI-driven decision-making, enhanced supply chain resiliency.

Module 6

Industry Aspects of Advanced SCM

6.1 Introduction to Industrial SCM

- **Overview of Industrial SCM:** Key processes in Industrial SCM: Procurement, Production, Distribution, and Logistics, Common limitations and challenges faced in traditional supply chain management, Value delivered by effective SCM and potential areas for improvement.

- **Disruptive Technologies in Supply Chain:** Cloud Computing: Artificial Intelligence (AI), Machine Learning (ML), Generative AI (Gen AI),Robotics, Block Chain, Quantum Computing.

6.2 Business Value from AI and Gen AI in Supply Chain

- **The strategic importance of AI and Gen AI in modernizing supply chains:** How AI/Gen AI can optimize processes, reduce costs, and increase agility, Opportunities for enhancing customer satisfaction and operational efficiency, Case studies demonstrating significant business value added through AI and Gen AI in SCM.

- **Industry-Leading Use Cases and Examples:** Real-world examples of AI and Gen AI transforming supply chain operations, Industry-specific applications in sectors like retail, manufacturing, healthcare, and logistics, Lessons learned from early adopters and successful implementations.

6.3 Risks and Challenges of Adopting AI and Gen AI in Industrial SCM

- **Risks, Challenges and Concerns:** Common risks associated with AI and Gen AI adoption in supply chains, Ethical concerns - Data privacy, algorithmic bias, and job displacement, Technical challenges - Data integration, system interoperability, and scalability, Resistance to change - Cultural and organizational barriers to AI adoption.

- **Implementation Recommendations:** Strategies for minimizing risks during AI and Gen AI implementation, Best practices for integrating AI into existing supply chain systems, Steps to ensure successful adoption - Pilot testing, stakeholder engagement, and continuous improvement, Maximizing business value through careful planning, execution, and monitoring.

Module 7

Policies of Logistics Management in Supply Chain with AI

7.1 Role of Supply Chain Management in the Organization

- **Understanding the Roles:** Strategic importance of supply chain management (SCM) in organizational success, Impact of effective SCM on cost reduction, customer satisfaction, and competitive advantage.

- **Supply Chain and General Business Strategy Alignment:** Aligning supply chain objectives with overall business goals, Strategic approaches for integrating SCM into the broader business strategy, Case studies on successful alignment of SCM and business strategy.

7.2 Warehousing Strategy for Efficient Supply Chain Management

- **Key Strategies for warehousing in AI Driven SCM:** Key components of an efficient warehousing strategy with AI, The role of AI based warehousing in supply chain effectiveness, Best practices in warehouse design, layout, and automation, Smart warehousing with AI.

- **Strategic Logistics Alliances:** Building and managing strategic alliances in logistics, Efficient Transportation & Customer Service Goals, Strategies for optimizing transportation within the supply chain, Emerging trends in transportation technology and their effects on SCM.

7.3 Technical Coverage of SCM with Multi-Dimensional Aspects

- **Information Technology (IT) for Supply Chain Management:** The role of IT in enhancing supply chain operations, Key technologies driving SCM efficiency - ERP, WMS, TMS, The future of IT in supply chain management.

- **Global Supply Chains and UN's Sustainable Development Goals:** The impact of global supply chains on sustainability, Aligning supply chain strategies with the UN's Sustainable Development Goals (SDGs).

- **Other Technical Concepts:** AI-Driven Demand Planning, AI for Supply Chain Visibility, Risk Management and AI.

Supply Chain Masterclass with AI Assistance

8.1 Supplier Selection and Relationship Management with AI

- **An Overview:** Criteria for selecting strategic suppliers using AI-driven tools, Techniques for managing and enhancing supplier relationships, Impact of AI on supplier performance monitoring and risk management.

- **Demand Forecasting Model:** Step-by-step guide to creating an AI-driven demand forecasting model, Key considerations - Data selection, model training, and validation, Real-world application: Building a demand forecasting model with AI, Predictive Analytics for Demand Forecasting.

8.2 Mastering Advancements in SCM with Modern Artefacts

- **Autonomous Vehicles and Drones in Logistics:** The impact of autonomous vehicles and drones on supply chain logistics, Current technologies and future trends in autonomous logistics, Regulatory and ethical considerations.

- **IoT and AI - A Synergistic Approach in Logistics:** How IoT and AI work together to enhance supply chain visibility and efficiency, Applications of IoT in real-time tracking, monitoring, and predictive maintenance, Case studies on IoT and AI integration in logistics.

- **·Block chain and AI Integration in Supply Chain:** How block chain and AI work together to enhance supply chain transparency and security, Applications of block chain in AI-driven supply chain processes.

- **Future Trends - AI, 5G, and the Smart Supply Chain:** How AI, 5G, and other emerging technologies are shaping the future of supply chains, Vision of the smart supply chain: Autonomous, responsive, and sustainable.