

College of Vocational Studies

Material Management

Semester VIII

DSC-1	Emerging Technologies in Materials Management
DSE-1	Lean Inventory and Operations Management
DSE-1	Advanced Logistics and Distribution Strategies
DSE-2	Application to data analytics with R
DSE-2	Economics of Start-ups
<u>GE Common Pool for BA (VS) Material Management</u>	
1	Offered by Department of History
2	Offered by Department of Political Science
3	Offered by Department of Economics
4	Offered by Department of Mathematics
5	Tourism Startups and Innovations (Offered by Department of Tourism Management)

Semester-VIII
DISCIPLINE SPECIFIC CORE (DSC-8.1)
Emerging Technologies in Materials Management

Credit Distribution, Eligibility and Pre-requisites the Course

Course Title & Code	Total Credits	Lectures	Tutorial	Practical	Eligibility	Prerequisite of the course
Emerging Technologies in Materials Management	4	3	1	-		

Learning Objectives:

- To understand the digital transformation in materials management and the role of Industry 4.0 technologies in supply chains.
- To explore the use of IoT, RFID, and sensor-based systems for real-time inventory management.
- To analyze blockchain applications for improving transparency and efficiency in procurement and supply chains.
- To examine the integration of automation, robotics, and AI in warehousing and materials handling.
- To introduce the concept of digital twins and simulation models for materials planning, scenario analysis, and risk management.

Learning Outcome:

Upon successful completion of this course, students will be able to:

1. Explain the components and impact of Industry 4.0 technologies on materials management and supply chains.
2. Evaluate the use of IoT and RFID technologies for real-time inventory tracking and predictive stock management.
3. Analyze blockchain technology's role in enhancing transparency, procurement processes, and product authentication.
4. Demonstrate the application of automation, robotics, and AI in warehousing and materials handling.
5. Apply digital twin technology and simulation models for materials planning, risk forecasting, and scenario analysis.

Unit	Contents	
Unit I	Introduction to Industry 4.0 and Smart Materials Management: Digital transformation of supply chains. Industry 4.0 components — Cyber-Physical Systems, Cloud Computing, Big Data, AI.	(10 Hours)
Unit II	IoT and Real-Time Inventory Tracking: Concepts of IoT. RFID vs Barcoding, smart shelves, sensor-based inventory. Predictive analytics in stock management.	(11 Hours)
Unit III	Blockchain for Supply Chain Transparency: Distributed ledger basics. Applications in procurement, contract execution, product authentication, and anti-counterfeit systems.	(12 Hours)
Unit IV	Automation, Robotics, and AI in Warehousing: AGVs, autonomous forklifts, robotic picking systems. AI-driven demand forecasting. Case studies of automated fulfillment centers.	(12 Hours)

Suggestive Reading Materials/References:

1. Wang, S., & Xu, C. (2017). *Industry 4.0: A Survey on Technologies and Applications*. Journal of Industrial Engineering and Management.
2. Çodur, S., & Erkeyman, B. (2025). **Blockchain Technology from The Supply Chain Perspective: A Systematic Literature Review**. *Spectrum of Decision Making and Applications*, 2(1), 268-285..
3. Zhang, G., Yang, Y., & Yang, G. (2023). *Smart supply chain management in Industry 4.0: the review, research agenda and strategies in North America*. *Annals of operations research*, 322(2), 1075-1117.
4. Reaidy, P., Alaeddini, M., Gunasekaran, A., Lavastre, O., & Shahzad, M. (2024). *Unveiling the impact of industry 4.0 on supply chain performance: the mediating role of integration and visibility*. *Production Planning & Control*, 1-22.
5. Ben-Daya, M., Hassini, E., & Bahrour, Z. (2019). *Internet of things and supply chain management: a literature review*. *International journal of production research*, 57(15-16), 4719-4742.
6. Tapscott, D., & Tapscott, A. (2016). *Blockchain Revolution: How the Technology Behind Bitcoin and Other Cryptocurrencies is Changing the World*. Penguin.
7. Groover, M. P. (2016). *Automation, production systems, and computer-integrated manufacturing*. Pearson Education India..
8. Min, H. (2010). *Artificial intelligence in supply chain management: theory and applications*. *International Journal of Logistics: Research and Applications*, 13(1), 13-39..
9. Jing, H., & Fan, Y. (2024). **Digital Transformation, Supply Chain Integration and Supply Chain Performance: Evidence From Chinese Manufacturing Listed Firms**. *SAGE Open*, 14(3), 21582440241281616..

Teaching Pedagogy/Methodology:

- **Lectures:** Introduction to emerging technologies and their role in materials management.
- **Case Studies:** Exploration of real-world applications of IoT, blockchain, and AI in supply chains and materials management.
- **Workshops:** Hands-on sessions with RFID, sensor-based inventory management systems, and blockchain applications.

- **Simulations:** Use of cloud-based simulation tools for digital twin applications and scenario planning.
- **Group Projects:** Design and implement a digital transformation strategy for a supply chain using emerging technologies.

SWAYAM Reference: SWAYAM references for blended learning (as NEP 2020 recommends integrating online modules. Since SWAYAM directly doesn't have a course titled " *Emerging Technologies in Materials Management* ", the closest and most relevant course available is:

https://onlinecourses.nptel.ac.in/noc20_mg70/preview

https://onlinecourses.nptel.ac.in/noc22_mm20/preview

https://onlinecourses.nptel.ac.in/noc23_mg89/preview

https://onlinecourses.nptel.ac.in/noc21_mg45/preview

Semester-VIII
DISCIPLINE SPECIFIC ELECTIVE (DSE-8.1)
Lean Inventory and Operations Management
 Offered by Commerce Department, College of Vocational Studies

Credit Distribution, Eligibility and Pre-requisites the Course

Course Title & Code	Total Credits	Lectures	Tutorial	Practical	Eligibility	Prerequisite of the course
Lean Inventory and Operations Management	4	3	1	-		

Learning Objectives:

1. **Understand Lean Principles:** Comprehend the fundamentals of lean thinking and the Toyota Production System (TPS).
2. **Optimize Processes:** Apply value stream mapping and process optimization techniques to enhance operational efficiency.
3. **Implement Pull Systems:** Utilize pull-based inventory systems, including Just-in-Time (JIT) and Kanban, to streamline inventory management.
4. **Foster Continuous Improvement:** Promote a culture of continuous improvement through methodologies like Kaizen and Total Productive Maintenance (TPM).
5. **Leverage Digital Tools:** Integrate digital technologies for real-time inventory tracking and data-driven decision-making.

Learning Outcome: