

Supply Chain Risk Management Mini Doctoral Course outline

Instructor: Dr. Piyal Sarkar

Email: pbs5628@psu.edu

Duration: 10 hours (5 Lectures)

1. Course Schedule

Tuesday July 07.07.2026, from 10am – 12pm **(M1)** and from 12pm - 2pm **(M2)**
Wednesday July 08.07.2026, from 10am – 12pm **(M3)** and from 12pm - 2pm **(M4)**
Thursday July 09.07.2026, from 10am – 12pm **(M5)**

2. Course Description

Module 1- Foundations of supply chain risk management (M1)

Topics covered:

- Introduction to Supply chain risk management
- Types of supply chain risks
- Risk assessment tools
- Quantitative risk analysis
- Emerging research topics

Suggested readings:

Ho, W., Zheng, T., Yildiz, H., & Talluri, S. (2015). Supply chain risk management: a literature review. *International journal of production research*, 53(16), 5031-5069.

Yang, M., Lim, M. K., Qu, Y., Ni, D., & Xiao, Z. (2023). Supply chain risk management with machine learning technology: A literature review and future research directions. *Computers & Industrial Engineering*, 175, 108859.

Choudhary, N. A., Singh, S., Schoenherr, T., & Ramkumar, M. (2023). Risk assessment in supply chains: a state-of-the-art review of methodologies and their applications. *Annals of Operations Research*, 322(2), 565-607.

Module 2- Supply chain risk hedging (M2)

Topics covered:

- Operational hedging
- Financial hedging
- Quantitative modeling approaches

- Research gaps and discussion

Suggested readings:

Chod, J., Rudi, N., & Van Mieghem, J. A. (2010). Operational flexibility and financial hedging: Complements or substitutes?. *Management Science*, 56(6), 1030-1045.

Bandaly, D., Satir, A., & Shanker, L. (2014). Integrated supply chain risk management via operational methods and financial instruments. *International Journal of Production Research*, 52(7), 2007-2025.

Kouvelis, P., Wu, X., & Xiao, Y. (2019). Cash hedging in a supply chain. *Management Science*, 65(8), 3928-3947.

Sarkar, P., Wahab, M. I. M., & Fang, L. (2023). Weather rebate contracts for different risk attitudes of supply chain members. *European Journal of Operational Research*, 311(1), 139-153.

Module 3- Supply chain resilience (M3)

Topics covered:

- Concepts and theory of resilience
- Cost-resilience trade off
- Quantitative approaches to design resilient supply chains (MCDM, Network optimization)
- Research gaps and discussion

Suggested readings:

Sarkar, P., Mohamed Ismail, M. W., & Tkachev, T. (2022). Bridging the supply chain resilience research and practice gaps: pre and post COVID-19 perspectives. *Journal of Global Operations and Strategic Sourcing*, 15(4), 599-627.

Lücker, F., Timonina-Farkas, A., & Seifert, R. W. (2025). Balancing resilience and efficiency: A literature review on overcoming supply chain disruptions. *Production and Operations Management*, 34(6), 1495-1511.

Module 4- Supply chain coordination and contracts (M4)

Topics covered:

- Supply chain contract structure
- Coordination
- Types of contracts: Wholesale price, buyback, revenue sharing
- New contracts and emerging research areas

Suggested readings:

Cachon, G. P. (2003). Supply chain coordination with contracts. *Handbooks in operations research and management science*, 11, 227-339.

Sabbaghnia, A., Heydari, J., Ülkü, M. A., & Zolfaghari, S. (2024). Sustainable supply chain coordination: extant literature, trends, and future research directions. *Annals of Operations Research*, 1-54.

Module 5- Supply chain risk methodologies and emerging research areas (M5)

Topics covered:

- Conditional Value at Risk
- Value at Risk
- LLMs for supply chain

Suggested readings:

Yang, L., Cai, G., & Chen, J. (2018). Push, pull, and supply chain risk-averse attitude. *Production and Operations Management*, 27(8), 1534-1552.

Sarkar, P., Wahab, M. I. M., & Fang, L. (2024). Weather rebate sharing contract for enhancing supply chain performance. *International Journal of Production Economics*, 272, 109260.

Wang, H., Jiang, J., Hong, L. J., & Jiang, G. (2025). LLMs for Supply Chain Management. *arXiv preprint arXiv:2505.18597*

3. Course books and pedagogy

The instructor will post materials for every module on Moodle. The course adopts a research-oriented and interactive pedagogical approach designed for doctoral students. The discussions will focus on: Research gaps, Methodologies, Theoretical contributions, and Practical implications. Students are encouraged to participate in the discussions.

4. Learning Outcomes

By completing this activity, students will be able to:

- Critically analyze emerging SCM issues
- Integrate academic literature into research discussions
- Identify doctoral research opportunities
- Identify methodologies to solve supply chain problems
- Connect theory with real-world supply chain challenges

5. Final Activity for students

The final activity is designed to help doctoral students critically explore an emerging issue in supply chain management and develop a concise research-oriented report integrating theory, literature, methodologies and future research opportunities. Students are expected to write a short 5 pages report identifying one of the research areas based on the discussions in the class.