COURSE SYLLABUS – Fall 2025 – Classroom Section
DEPT OF MECHANICAL & INDUSTRIAL ENGINEERING

IE 659 – Supply Chain Engineering

A TOP 100 NATIONAL UNIVERSITY

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CATALOG DESCRIPTION

Coordination of product manufacturing and logistic activities across the global supply chain is studied. Focus is on supply chain design, implementation, and control. Topics include transportation and distribution networks, inventory control, demand planning, materials handling, and warehousing, supply chain contracts, manufacturing flexibility, product design for responsiveness, and ERP systems. Supply chain analytics concepts and relevant case studies are introduced.

COURSE FOCUS

Supply Chain Management focuses on managing material and information flows across the product delivery enterprise. This course will present and discuss in detail the key operational capabilities that a supply chain system must develop to support the business strategy of a firm. The relationship between the desired capabilities and the structure of a supply chain will be modelled and analyzed. Contemporary methods associated with the design and management of industrial Supply Chains (SC) will be studied. Supply chains are concerned with the efficient integration of suppliers, factories, warehouses, and stores so that products are distributed to customers in the right quantity and at the right time. One of the primary objectives of SC management is to minimize the total supply chain cost subject to various service requirements, and cost analysis will be a focus of the studied methods.

Modern supply chains are optimized for performance, and the course will have a strong quantitative focus.

LEARNING OUTCOMES

- Students will be able to describe and explain the fundamentals of Supply chains and derive and compute optimal policies/variables, performance measures such as costs/profits, and be aware of SC practices.
- Students will gain exposure to quantitative methodologies and analysis that support operations and supply chain strategy and planning decisions, using case studies and the development of analytical spreadsheet models.
- Students will learn how to formulate and solve decision models for a wide range of supply chain problems.

CANVAS

The course will make extensive use of the Canvas system to optimize student-instructor communication. All course materials including lecture slides and homework etc. will be distributed through Canvas.

All submissions of homework and other assignments will also be through Canvas. To access the system please go to http://canvas.njit.edu/, you will need a valid UCID to log in.

IN-CLASS SESSIONS: Mondays from 6.00 pm.

CLASSROOM: KUPF 106 (Kupfrian Hall)

WEEKLY ASSIGNMENTS

Academic success in this class is greatly dependent on your study plan. A key determinant of course success and learning effectiveness will be the discipline with which you complete the assigned tasks. Typical weekly activities include:

LECTURE CLASS: Review the associated PowerPoint file provided in Canvas. Attend the in-class session.

INDUSTRY VIDEO: Click on the Video links in each topic and view the recordings. All videos are 7 minutes or less.

READINGS: Download and review the readings on each topic.

TOPIC QUIZ: Associated with each topic there will be a quiz in which I will post 2 to 4 questions. You will post your answers online. The questions will be related to the current topic and will contribute to your grade.

GRADING

Based on individual and team performance as follows:

20%	**Exam #1**	20%	**Exam #3**	12%	**Tech Solution Case Study**
20%	**Exam #2**	15%	**Topic Quizzes 1 to 9**	8%	**PS-Analyzer Project**
5%	**SAP Case Study Exercise**				

Each Exam will consist of three parts: (i) An Online Numerical Section – consisting of numerical questions (ii) An Online Multiple-Choice Section, and (iii) An Offline Section – consisting of numerical questions which require solutions on Excel. For sections (i) and (ii) questions are uniquely generated for each student and responses are entered directly into Canvas, for section (iii) answers are recorded in Excel, PDF, or Word files which are then uploaded to Canvas.

The Exam dates are listed below in the outline.

LECTURE SLIDES, SUGGESTED TEXTBOOKS, AND READINGS

IE 659 Supply Chain Engineering lecture slides by Prof. Sanchoy Das will be distributed electronically through Canvas

Supply Chain Management: Strategy, Planning, and Operations, by Sunil Chopra and Peter Meindl, Pearson, 6th Edition, ISBN-13: 978-0133800203

Fast Fulfillment: The Machine that Changed Retailing, by Sanchoy Das, Business Expert Press, 2025, ISBN-13: 978-1637420768 https://www.amazon.com/author/sanchoydas

Course Readings – Several papers/reports (R1 to R9) have been selected to complement the weekly topics. Papers are listed below, please complete each reading before the start of the topic.

TECHNOLOGY SOLUTION CASE STUDY

Technology solutions are vendor-provided solutions that a company will implement to improve the productivity of its operations. Such solutions range from purely software solutions to those with a significant analytical component. The technology solution project will be completed in teams. Use the *Canvas Community Forum* to solicit and build your teams.

The case study is designed to be a technology innovation presentation that your team (managers) is making to the rest of the class (company executives). The goal is to convince the executives that the technology solution opportunity is significant, and the company must proceed with adoption immediately. As in any technical presentation, your objectives are: (i) to educate the client about what your proposed solution does (ii) how the solution is implemented (steps, phases, or components), and (iii) what are the likely benefits. Each team will be assigned a unique solution in the supply chain area.

Each team will consist of 4 students. Your team will collaborate using available online and mobile technologies. The team is required to review and discuss the assigned solution and create a detailed PowerPoint report. The team will be making a 15-minute in-class presentation. Presentations will be scheduled as noted in the outline below. Teams are expected to communicate digitally through email, text messages, and Skype. You are encouraged to use Google Drive (part of NJIT WebMail) to share project documents.

Project Forum: Each team will also be assigned the role of client for another project. The client team will present 2 questions to the solution team during the in-class presentation. These questions will be part of your grade.

COURSE OUTLINE – Organized on a weekly schedule.

#	CHAPTER	TOPIC

SECTION-1: Modeling Perspective

1. 1, 2, 3 **Introduction to Supply Chain Management** – *9/8/2025*

- Supply Chain Strategic Goals
- Supply Chain Performance Metrics and Strategic Objectives
- Example Modern Supply Chains: McDonald's and Home Depot

Lecture #1: Introduction to Supply Chain Management
Video: V1. McKinsey & Co - Omnichannel Shopping
Video: V2. Oracle - Consumer Goods in Supply Chains
Reading: R1. Digitization Makes the Supply Chain More Efficient

2. 4, 5 **Network Flow Optimization** – *9/15/2025*

- Distribution Network Basics
- Cross Docking Operations
- Configuration of Logistics Networks
- Logistics Networks Design – LP Solution by Excel Solver
- Process Speed Analyzer Tool (PS-Analyzer)

Lecture #2: Network Flow Optimization
Lecture: PS-Analyzer Tool
Video: V3. General Mills Global Sourcing
Video: V4. Oracle Integrated Business Planning
Reading: R2. Industrial Distributors: Roles and Opportunities

PS Analyzer Project – Week of 9/22/2025

3. 7, 9 **Demand Planning in Supply Chains** – *9/22/2025*

- Demand Management Objectives
- Forecasting Tools: Moving Average & Linear Regression
- The Bullwhip Effect

Lecture #3: Demand Planning in Supply Chains
Video: V5. Sleep Better with SAP: Hastens Implementation
Video: V6. Starbucks Global Supply Chain
Reading: R3. SAP Demand Sensing & Shaping

EXAM #1 –10/3/2025 to 10/7/2025

4. 11, 12 **Inventory Control Models – Certain & Uncertain** – *9/29/2025 & 10/6/2025*

- The Role & Cost of Inventory in the Supply Chain
- Economic Order Quantity Models and Extensions
- Reorder Point Inventory Systems
- Newsvendor Inventory Problem
- Risk Pooling: Centralized Inventory

Lecture #4A: Inventory Control in Supply Chains
Lecture #4B: Uncertainty & Risk in Inventory
Video: V7. SAP Business Network
Video: V8. Crocs Partners with Manhattan
Video: V9. Zara Fast Fashion Business Model
Reading: R4. Fresh Express: Six-Day Perishable Supply Chain
Reading: R5. Rapid Fire Fulfillment at Zara

SECTION-2: Enterprise Perspective

5. **Materials Requirements Planning (MRP)** – *10/13/2025 & 10/20/2025*
- Bill of Materials and Process Plans
- MRP Scheduling Algorithm
- Advanced Lot Sizing Methods

Lecture #5: Materials Requirements Planning
Video: V10. Oracle Ice Cream Logistics
Video: V11. Lennox International - Supply Chain Integration
Reading: R6. AI Supply Chain Management

EXAM #2 – 10/31/2025 to 11/4/2025

6. 15 **Supply Chain Contracts** – *10/27/2025*
- Supply Contracts & Sourcing Flexibility
- Revenue Sharing Models

Lecture #6: Supplier Selection & Supply Contracts
Video: V12. SAP Business One Demo - Inventory
Reading: R7. SAP Tomorrow's Supply-Chain

7. 16 **Supply Pricing & Revenue Management** – *11/3/2025 & 11/10/2025*
- Pricing to Multiple Segments
- Perishable Assets Dynamic Pricing
- Supply Chain Analytics
- Gartner Top 25: Metrics and Findings

Lecture #7: Supply Pricing & Revenue Management
Video: V13. SAP and ZIM Shipping
Reading: R8. Gartner Supply Chain Top 25

8. **Fast Fulfillment & Online Retail Supply Chains** – *11/17/2025 & 11/24/2025*
- The Amazon Fulfillment Warehouse
- Online Fulfillment Key Differentiators
- Analytics-driven decision models

Lecture #8A: Fast Fulfillment and Retail Logistics

Lecture #8B: Order Fulfillment - Design & Operations Management
Video: V14. A Day in the Life of an Amazon Package
Video: V15. Inside one of Amazon's Busiest Days
Reading: R9. Ecommerce Fulfillment Warehouses

9. 17 **Information Tech & ERP in Supply Chains –** *12/1/2025 – Elson Cibaku*

- Introduction to ERP Systems and their Modules
- Introduction to SAP Modules
- SAP Supply Chain Management

Lecture #9A: Enterprise Resource Planning Systems
Lecture #9B: Introduction to SAP
Video: V16. SAP The Digitalization of Supply Chains
Video: V17. SAP Supply Chain Management Overview
SAP Learning Resources – Optional study

1. SAP-SCM Tutorial:
   https://www.tutorialspoint.com/sap_scm/sap_scm_tutorial.pdf
2. SAP-SCM Overview Slides
3. SAP Material Management (MM) Training Video
   https://www.youtube.com/watch?v=X8Q6lJi-MuY
4. SAP-MM Certification
   https://sap-certification.info/mm/

10. **Technology Solution Project Presentations** *–12/8/2025*

EXAM #3 –12/15/2025 In-Class

ACADEMIC INTEGRITY:

Academic Integrity is the cornerstone of higher education and is central to the ideals of this course and the university. Cheating is strictly prohibited and devalues the degree that you are awarded. As a member of the NJIT community, it is your responsibility to protect your educational investment by knowing and following the academic code of integrity policy that is found at: http://www5.njit.edu/policies/sites/policies/files/academic-integrity-code.pdf

Please note that it is my professional obligation and responsibility to report any academic misconduct to the Dean of Students Office. Any student found in violation of the code by cheating, plagiarizing, or using any online software inappropriately will result in disciplinary action. This may include a failing grade of F, and/or suspension or dismissal from the university.

If you have any questions about the Code of Academic Integrity, please contact the Dean of Students Office at dos@njit.edu