Course Outline

Course Code   : DOS4716
Course Title   : Advanced Operations and Supply Chain Management
Class Date   : From 13/1/2026   To 17/4/2026
Semester   : Semester 2, Academic Year 2025/2026
Faculty   : Loh Tick Kwang, Tan Hong Ming
Department   : Analytics & Operations

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Overview

This advanced course prepares students to design, manage, and transform operations and supply chains for global competitiveness. Integrating strategy, process design, and digital innovation, the course explores key topics such as cost optimization, capacity planning, demand forecasting, sustainability, and risk management. Students will gain practical experience with continuous improvement approaches including Lean, Six Sigma, and Business Process Re-engineering, while also learning how digital tools and analytics are reshaping supply chain resilience and agility. Through hands-on simulations, interactive workshops, and data-driven projects, participants will apply analytical methods to solve complex operational and supply chain challenges. Case studies from Toyota, Tesla, Shein, and ASML provide industry-tested insights, equipping students to excel in dynamic, technology-driven environments worldwide.

Course Objectives

By the end of this course, students will be able to:

Understand Modern Operations Management
- Gain a comprehensive grasp of operations management's core components, including the entire product development cycle for companies
- Understand the influence of these components on quality, cost, organizational behavior, and interdepartmental collaboration in diverse industries.

Apply Strategic Deployment in Business
- Learn to construct and map an end-to-end value stream, from product design to customer quality management.
- Comprehend the connections between each segment of the value stream and their distinct challenges and opportunities

Explore and Exploit Operational Value Streams
- Distinguish between traditional and progressive value streams, understanding their respective challenges and benefits.
- Develop innovative strategies for analyzing and suggesting improvements to operational value streams.

Leverage on Analytical Tools
- Acquire skills in employing a range of analytical tools at various stages of the value stream and across different sectors, like product development and customer engagement.

Consolidate and Apply Learning
- Integrate knowledge and skills in operations management and analytics to drive performance, quality improvement, and cost reduction.
- Learn to implement analytics effectively in real-world business contexts, optimizing outcomes in various operational areas.

Assessment

Assessment Components	Weightage
Participation	10%
2 Individual Homework	30%
1 Group Project	30%
In-Class Individual Project	30%

Schedule and Outline

Lesson/Week	Date	Session
1	16 Jan	Introduction to Modern Operations & Supply Chains: Overview of megatrends, role of operations, foundational concepts.
2	23 Jan	Product Development, NPI & Value Chain: Lifecycle, NPI phases, link between design, operations, supply chain.
3	30 Jan	Process Strategy & Forecasting: Process choices, trade-offs, basic forecasting techniques.
4	6 Feb	Cost Structure & COGS: BOM, fixed vs variable cost, cost drivers, optimization levers.
5	13 Feb	Quality Management & Lean: Quality tools, cost of poor quality, Lean principles.
6	20 Feb	Supply Chain Management & Supplier Engagement: End-to-end design, supplier involvement, KPIs.
Reading	No Class	No Class
7	6 Mar	Analytics for Operations (Part 1): KPIs, dashboards, descriptive & diagnostic analytics.
8	13 Mar	Analytics for Operations (Part 2): Supervised/unsupervised learning, forecasting, clustering.
9	20 Mar	Digital Transformation: Dashboards, preventive analytics, predictive ML, resilience.
10	27 Mar	Anomaly Detection & Risk: Outlier detection, operational risks, mitigation frameworks.
11	3 Apr	Customer-Centric Operations: VOC, customer metrics, feedback loops, service quality.
12	10 Apr	Capstone Simulation & Presentation: Integrated decision-making, group presentation.
13	17 Apr	Capstone Simulation & Presentation: Integrated decision-making, group presentation.

General Guide & Reading (e.g. Case preparation guide, project report guide, main textbook & supplementary materials, etc)

Academic Honesty & Plagiarism
Academic integrity and honesty is essential for the pursuit and acquisition of knowledge. The University and School expect every student to uphold academic integrity & honesty at all times. Academic dishonesty is any misrepresentation with the intent to deceive, or failure to acknowledge the source, or falsification of information, or inaccuracy of statements, or cheating at examinations/tests, or inappropriate use of resources.

Plagiarism is 'the practice of taking someone else's work or ideas and passing them off as one's own' (The New Oxford Dictionary of English). The University and School will not condone plagiarism. Students should adopt this rule - You have the obligation to make clear to the assessor which is your own work, and which is the work of others. Otherwise, your assessor is entitled to assume that everything being presented for assessment is being presented as entirely your own work. This is a minimum standard. In case of any doubts, you should consult your instructor.

Additional guidance is available at:

- Administrative Policies
- http://www.nus.edu.sg/registrar/administrative-policies-procedures/acceptance-record#NUSCodeofStudentConduct
- http://nus.edu.sg/osa/resources/code-of-student-conduct