

| Course Code                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | Course Title                           | L                | T | P | C |
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| OLMDS609                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Supply Chain Analytics                 | 3                | 1 | 0 | 4 |
| Pre-requisite                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | NIL                                    | Syllabus version |   |   |   |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                                        | 1.0              |   |   |   |
| Course Objectives:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                                        |                  |   |   |   |
| <div>1. To enrich the importance of the basics of Business Analytics and Optimization Understand the importance of the basics of Supply Chain Analytics and Optimization.</div> <div>2. To analyze the level of uncertainty associated with the supply of products and services to targeted customer segments and justify the choice of a supply chain strategy and its fit with competitive strategy.</div> <div>3. To Explain the role and applications of Descriptive, Predictive and Prescriptive Analytics in a Supply Chain.</div> |                                        |                  |   |   |   |
| Course Outcomes:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                                        |                  |   |   |   |
| <div>1. Basic insight in mathematical formulation of operations and supply chain management problems.</div> <div>2. Understand the strengths and weaknesses of various modelling approaches.</div> <div>3. Perform practical quantitative analysis related to operations and supply chain management.</div> <div>4. Understand the relevance of quantitative analysis related to operations and supply chain management and the implication related to competence requirements in the companies.</div>                                   |                                        |                  |   |   |   |
| Module:1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Introduction to supply chain analytics |                  |   |   |   |
| Understanding functional activities or data set relevance to logistics and supply chain management- Strategies for data collection and aggregation- Approaches to analysis of functional data-Integrating results of functional analyses to better understand logistics and supply chain performance-Developing improvement strategies based on results of data analyses                                                                                                                                                                 |                                        |                  |   |   |   |
| Module:2                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Supply planning analytics - I          |                  |   |   |   |
| Procurement and Strategic Sourcing - Inventory Modeling-aggregate planning and resource allocation decisions- Procurement Analytics- Production Modeling.                                                                                                                                                                                                                                                                                                                                                                                |                                        |                  |   |   |   |
| Module:3                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Supply planning analytics - II         |                  |   |   |   |
| Prescriptive Analytics: Making the Best Decisions in Settings with Low Uncertainty- Decision Trees, Making the Best Decisions in Settings with High Uncertainty- Warehouse location and the GRG Multi-start and Evolutionary Solver engines-case studies                                                                                                                                                                                                                                                                                 |                                        |                  |   |   |   |
| Module:4                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Demand Fulfillment analytics           |                  |   |   |   |
| Demand Fulfillment- Price optimizing-optimizing inventory levels in distribution network - Transportation modeling- delayed differentiation, mass customization- Predictive Analytics: Risk and Evaluation of Alternatives - Using Solver to solve transportation or distribution problems-Demand Uncertainty, Forecasting, and the Newsvendor Problem-case studies                                                                                                                                                                      |                                        |                  |   |   |   |
| Module:5                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Supply Chain Network Design analytics  |                  |   |   |   |
| Value of Supply Chain Network Modeling- Intuition Building with Center of Gravity Models- Locating Facilities Using a Distance-Based Approach- Alternative Service Levels and Sensitivity Analysis- Adding Capacity to the Model- Adding Outbound Transportation to the Model- Introducing Facility Fixed and Variable Costs- Baseline and Optimal Baselines- Three Echelon Supply Chain Modeling- Adding                                                                                                                                |                                        |                  |   |   |   |

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| Multiple Products and Multi-Site Production Sourcing- Multi-Objective Optimization- The Art of Modeling- Data Aggregation in Network Design.                                                                                                                              |                                                                                                                                                                                        |            |                 |
| Module:6                                                                                                                                                                                                                                                                  | Integrated supply chain analytics                                                                                                                                                      |            |                 |
| Advanced and business supply chain related topics like CPFR, DDSN, Make/Buy - Total Supply Chain Cost- computation of transfer prices -revenue management-yield management -product changes/economies of scale- Recommendation production and prioritization case studies |                                                                                                                                                                                        |            |                 |
| Module: 7                                                                                                                                                                                                                                                                 | Advanced Analytics in supply chain                                                                                                                                                     |            |                 |
| Big data analytics, Machine Learning, Sustainability analytics including life cycle assessment (LCA), Analytic Hierarchy Process, Data Envelopment Analysis(DEA), Multi criteria decisionsmaking(MCDM) Fuzzy Logic and Techniques-Application in SCM.                     |                                                                                                                                                                                        |            |                 |
|                                                                                                                                                                                                                                                                           | Total Lecture hours                                                                                                                                                                    |            | 120 hours       |
| Text Book(s)                                                                                                                                                                                                                                                              |                                                                                                                                                                                        |            |                 |
| 1.                                                                                                                                                                                                                                                                        | Raman A, Fisher M, How Analytics Are Transforming the Supply Chain and Improving Performance, HBS Press, 2010.                                                                         |            |                 |
| 2.                                                                                                                                                                                                                                                                        | Watson M, Supply Chain Network Design: Applying Optimization and Analytics to the Global Supply Chain, Pearson Education, 2014.                                                        |            |                 |
| 3.                                                                                                                                                                                                                                                                        | Joel D Wisner, G. Keong Leong, Keah-Choon Tan, Supply Chain Management A Balanced Approach , 3 <sup>rd</sup> edition Cengage Learning, 2012.                                           |            |                 |
| Reference Books                                                                                                                                                                                                                                                           |                                                                                                                                                                                        |            |                 |
| 1.                                                                                                                                                                                                                                                                        | Tayur S,Ganeshan R, Michael, (1999), M. Quantitative Models for Supply Chain Management. Kluwer Academic Publishers.                                                                   |            |                 |
| 2.                                                                                                                                                                                                                                                                        | Winston, Wayne L, S. Christian Albright, (2001), Practical Management Science,3 <sup>rd</sup> edition, Pacific Grove, CA: Duxbury.                                                     |            |                 |
| 3.                                                                                                                                                                                                                                                                        | Feigin G, (2011), Supply Chain Planning and Analytics: The right product to the right place at the right time, Business Expert Press, New York, USA.                                   |            |                 |
| 4.                                                                                                                                                                                                                                                                        | Fisher M, Raman A, (2010), The New Science of Retailing: How Analytics are Transforming the Supply Chain and Improving Performance, Harvard Business Press, Boston,Massachusetts, USA. |            |                 |
| 5.                                                                                                                                                                                                                                                                        | Handfield R, (2006), Supply Market Intelligence: A managerial handbook for building sourcing strategies, Taylor and Francis Group, Auerbach Publications, New York, USA.               |            |                 |
| 6.                                                                                                                                                                                                                                                                        | Chopra S,Meindl P, (2016), Supply Chain Management: Strategy, Planning and Operation, 6 <sup>th</sup> edition, Pearson Education, USA.                                                 |            |                 |
| 7.                                                                                                                                                                                                                                                                        | Plenert, G. J, (2014), Supply Chain Optimization through Segmentation and Analytics, 1 <sup>st</sup> edition, CRC Press.                                                               |            |                 |
| Mode of Evaluation: Continuous Assessment Tests, Seminars, Quiz, Assignments, FinalAssessment Test.                                                                                                                                                                       |                                                                                                                                                                                        |            |                 |
| Recommended by Board of Studies                                                                                                                                                                                                                                           |                                                                                                                                                                                        | 16-10-2023 |                 |
| Approved by Academic Council                                                                                                                                                                                                                                              |                                                                                                                                                                                        | No. 72     | Date 13-12-2023 |