

SYLLABUS

QM402E

Analytical and Decision-Making Techniques in SCM

ACADEMIC AREA :	OPERATIONS AND ANALYTICS
PROGRAMME :	MASTER LSCM / MASTER LSCP / PGE / UGTC LEVEL 4 PGE
PERIOD :	SPRING
COORDINATOR :	Mr. Sohrab FARAMARZI OGHANI
INSTRUCTOR(S) :	Mr. Sohrab FARAMARZI OGHANI
CONTACT HOURS :	24.0 hours
STUDY TIME :	null hours (Class preparation, homework and assessments)
CREDITS :	4.0 ECTS
AOL :	NO

PRE-REQUISITE MODULES :

- Basic understanding of supply chain management (SC401E)
- Basic knowledge of statistics/mathematics (RM402E)
- Basic knowledge of MS Excel

MODULE DESCRIPTION :

This module presents how data and business analytics can be applied to practical business situations in logistics and supply chain management to facilitate decision-making and improve system performance, productivity, and profitability. In this module, three components of business analytics, including descriptive, predictive, and prescriptive analytics, will be discussed, and their application to deal with supply chain decision and optimization problems will be illustrated. This module will help students foster analytical thinking and problem-solving skills to overcome existing and emerging supply chain challenges.

CONTRIBUTION TO PROGRAMME LEARNING OBJECTIVES :

- Integrate disciplines and deep knowledge to Create innovative solutions #CreateSolutions

MODULE INTENDED LEARNING OUTCOMES (ILOs) :

After successfully completing this module, the students should be able to: 1. Explain the major components of analytics 2. Apply techniques to describe the current status of the business and to monitor the KPIs 3. Use spreadsheet modeling to analyze business problems 4. Incorporate uncertainty into problem analysis and conduct Monte-Carlo simulation 5. Apply decision-making and optimization techniques to solve logistics/SCM problems 6. Design and develop basic simulation models to imitate the behavior of a production system/supply network

TOPICS COVERED :

- Major components of analytics - Descriptive analytics [data visualization, data exploration] - Predictive analytics [spreadsheet modeling, uncertainty analysis, Monte-Carlo simulation] - Descriptive analytics [Decision-making techniques, mathematical modeling, optimization, simulation]

RESEARCH-LED TEACHING :

The application of decision-making and optimization techniques in the field of logistics and supply chain management will be discussed through the use of following research papers:

- Faramarzi-Oghani, S., Dolati Neghabadi, P., Talbi, E. G., & Tavakkoli-Moghaddam, R. (2022). Meta-heuristics for sustainable supply chain management: A review. International Journal of Production Research, 1-31.
- Agi, M. A., Faramarzi-Oghani, S., & Hazr, Ö. (2021). Game theory-based models in green supply chain management: a review of the literature. International Journal of Production Research, 59(15), 4736-4755.

CSR AND SUSTAINABLE DEVELOPMENT GOALS :

The main focus of this module is on decision-making, optimization, and simulation techniques; however, these methods can be used to deal with current sustainability issues in the field of logistics and SCM.

CSR NB HOURS :

SUSTAINABLE DEVELOPMENT GOALS COVERED :

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TEACHING METHODS :

The topics will be covered mainly through lectures, examples, and hands-on exercises. Several short exams will be set up to encourage students, progressively assess their learning, and provide timely feedback. For this module, two pieces of software will be used: MS Excel and FlexSim simulation software.

METHODS OF ASSESSMENT :

Continuous/Final	Group/Individual	Assessment	Weight	Duration	ILOs assessed
Continuous	Individual	Written in class	30%	1,5 Heure	1, 2, 3, 4
Continuous	Individual	Written in class	50%	1,5 Heure	1, 2, 3, 4, 5, 6
Final	Group	Written assessment at home	20%		1, 2, 3, 4, 5, 6

Assessment 1 details:

This individual assessment will take place during the 4th of the course and cover the topics of sessions 1, 2, and 3. MS Excel is necessary to answer the questions. More details will be provided in the first session of the course.

Assessment 2 details:

This individual assessment will take place during the 8th of the course and cover the topics of all sessions. MS Excel and/or FlexSim software is necessary to answer the questions. More details will be provided in the first session of the course.

Assessment 3 details:

Each group must identify a decision-making or optimization problem in LSCM which has not been covered in the course and must then provide the following:

- Problem description
- Application of the problem in LSCM
- An illustrative example
- A solution approach implemented in MS Excel, Python, or FlexSim

ACADEMIC INTEGRITY :

Academic misconduct encompasses various behaviors or actions that violate the principles of academic integrity, fairness, and honesty, thereby undermining the credibility of academic work, assessments, or research. Examples of academic misconduct include:

- Cheating
- Plagiarism
- Fabrication
- Gaining an unfair advantage
- Assisting others in committing academic misconduct, such as by utilizing generative AI
- Falsification of records or official documents
- Unauthorized access to restricted information or data
- Unauthorized or unethical use of generative AIS

Academic misconduct is a serious offense and can result in consequences such as module failure, research project failure, or even expulsion from the school. To prevent unintentional academic misconduct, it is essential to consult with your instructor to understand the specific rules and instructions pertaining to the use of AI in learning and assessment.

For more comprehensive information on academic integrity rules, principles, and disciplinary procedures, please refer to the Academic Integrity section of the Student Handbook.

BIBLIOGRAPHY :

- Evans, J. (2020). Business Analytics. (3rd edn). Pearson Education. [eBook <https://bit.ly/3TuFyXS>]
- Krajewski, L.J., Ritzman L.P., and Malhotra, M.K. (2018). Operations Management: Processes and Supply Chains. (12th edn). Pearson ed. [eBook <https://bit.ly/3Gqg07t>]
- Heizer, J. and Render, B. and Munson, C. (2019). Operations Management: Sustainability and Supply Chain Management. (13th edn) Harlow: Pearson Education. [eBook <https://bit.ly/333Uze9>].

Additional Reading

- Chopra, S., & Meindl, P. (2018). Supply Chain Management: Strategy, Planning and Operation (7th edn), Pearson Education. [eBook <https://bit.ly/39FyMg2>].

MODULE PLAN SESSIONS :

Plan Session 01 :

- Course overview
- Introduction to analytics
- Descriptive analytics [data visualization & exploration]

Plan Session 02 :

- Spreadsheet modeling
- Several business-related examples
- Uncertainty in decision models
- Monte-Carlo simulation

Plan Session 03 :

- Basic decision-making techniques
- Break-even analysis
- Preference matrix
- Decision theory
- Decision tree

Plan Session 04 :

- First assessment (in computer): Individual analysis of several questions related to topics covered in sessions 1, 2, & 3
- Solving the assessment's problems and providing feedback to students
- Introduction to mathematical programming
- Application of knapsack problem in LSCM

Plan Session 05 :

- Transportation problem
- Transshipment problem
- Assignment Problem

Plan Session 06 :

- Application of graph modeling in LSCM
- Simulation modeling

Plan Session 07 :

- Simulation in FlexSim Software
- Digital twin of a production system

Plan Session 08 :

- Second assessment (in computer): Individual analysis of several questions related to topics covered in all sessions
- Solving the assessment's problems and providing feedback to students
- Course sum-up and closure

