

Logistics Management and Control System Specification and Evaluation

Code: 44769

Credits: 10

2026/2027

Degree programme	Type	Course
Logistics and Supply Chain Management	OP	2

Contact lecturer

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Teaching staff (external to UAB)

Dr. Thomas Kopsch

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Prof. Dr. Thomas Masurat

Prof. Dr. Gaby Neumann

Group languages

You can consult this information at the [end](#) of the document.

Prerequisites

The student has to have successfully passed the following subjects:

- Decision making (44760)
- Material handling and transportation technologies (44762)
- Information Technology (44761)

Objectives

This module has three course units: Management system specification in production and logistics (Prof. Dr. Thomas Masurat, Prof. Dr. Gaby Neumann, Stefan Viehmann), XR technologies in logistics and supply chain management (Prof. Dr. Gaby Neumann), and AI application in logistics and supply chain management (Dr. Thomas Kopsch) .

CU1: Management system specification in production and logistics (5 ECTS)

After the course the student will:

- understand specific requirements of management systems in production and logistics and their complexity
- understand specification needs and market situation of management systems in production and logistics in general and with regard to Manufacturing Execution Systems (MES), Warehouse Management Systems (WMS), Shopfloor Management Systems (SFMS), Management Information Systems (MIS) and Customer Information Systems (CIS) in particular
- be able to apply procedure, methods, tools for specifying, selecting, implementing, testing and analysing specific management systems
- be able to evaluate alternative solutions and select the management system to be implemented (including tendering procedure)
- be able to evaluate the impact of latest technological advancements, like e.g. Industry 4.0, digitalization and Artificial Intelligence, on the future appearance, need, and functionality of management systems in production and logistics
- be able to use creativity techniques to derive new ideas for visionary concepts for the adaptation of the systems or formulating new requirements to these systems based on new development in the ongoing digitalization tendencies in industry
- be able to elaborate solid arguments to convince and motivate decision makers

CU2: XR technologies in logistics and supply chain management (2.5 ECTS)

After the course the student will:

- understand chances and challenges from using XR technologies within or in support of logistics management and control systems.
- be able to purposefully use selected XR technologies, particularly related to Virtual, Assisted and Augmented Realities, in a given application context (e.g. shopfloor management, management or customer information, order picking guidance, etc.)
- be able to critically compare and evaluate products and solutions representing XR technologies in view of their suitability for specific application purposes in logistics management and control
- be able to elaborate solid arguments to convince and motivate decision makers

CU3: AI application in logistics and supply chain management (2.5 ECTS)

After the course the student will:

- understand the basic principles of supervised and unsupervised machine learning, and distinguish between regression, classification, and clustering problems in logistics and supply chain management
- be able to apply selected basic machine-learning algorithms to logistics management problems using Python
- be able to relate selected advanced AI concepts, such as deep learning or reinforcement learning, to potential applications in logistics management systems
- be able to analyse logistics management and control processes to identify decision-making activities that can (or cannot) be supported by AI
- be able to evaluate and interpret model results and assess their usefulness for decision-making in logistics management, taking into account prediction errors, the bias-variance tradeoff and the consequences of incorrect decisions
- be able to develop, document and present a small AI-based prototype for a selected logistics management application and critically reflect on its performance and limitations
- be able elaborate solid arguments to convince and motivate decision makers

Learning outcomes

- CA21 (Use procedures, methods and tools to specify, select, implement, test and analyse

cyber-physical production systems by identifying and assessing the risk of using autonomous technology (i.e., mobile robots) and the importance of social and technical standards.) Use procedures, methods and tools to specify, select, implement, test and analyse cyber-physical production systems by identifying and assessing the risk of using autonomous technology (i.e., mobile robots) and the importance of social and technical standards.

- CA22 (Devise and/or adapt procedures for gathering and communicating data from the process environment using simple, open-source software tools.) Devise and/or adapt procedures for gathering and communicating data from the process environment using simple, open-source software tools.
- CA23 (Develop new ideas and visionary concepts in order to adapt management systems, or come up with new requirements for these systems based on new developments and current digitalisation trends in the industry.) Develop new ideas and visionary concepts in order to adapt management systems, or come up with new requirements for these systems based on new developments and current digitalisation trends in the industry.
- KA26 (Identify the requirement specifications and market availability of production and logistics management systems in general in terms of production planning and control systems (PPC), manufacturing execution systems (MES), warehouse management systems (WMS) and shop floor management systems (SFMS).) Identify the requirement specifications and market availability of production and logistics management systems in general in terms of production planning and control systems (PPC), manufacturing execution systems (MES), warehouse management systems (WMS) and shop floor management systems (SFMS).
- SA32 (Select and apply appropriate methodologies and strategies to specify and implement the requirements of a logistics-related management and control system and of cyber-physical production systems whilst taking their complexity into account.) Select and apply appropriate methodologies and strategies to specify and implement the requirements of a logistics-related management and control system and of cyber-physical production systems whilst taking their complexity into account.
- SA33 (Apply procedures, methods and tools to specify, select, implement, test and analyse the entities of cyber-physical production systems and PPC and WMS systems.) Apply procedures, methods and tools to specify, select, implement, test and analyse the entities of cyber-physical production systems and PPC and WMS systems.
- SA34 (Assess the impact of the latest technological developments, such as Industry 4.0 and digitalisation, on the future emergence, requirements and features of production and logistics management systems.) Assess the impact of the latest technological developments, such as Industry 4.0 and digitalisation, on the future emergence, requirements and features of production and logistics management systems.
- SA35 (Evaluate different alternatives and select a logistics management and control solution to implement (including the tendering procedure).) Evaluate different alternatives and select a logistics management and control solution to implement (including the tendering procedure).

Contents

CU1: Management system specification in production and logistics (5 ECTS)

- Management systems in production and logistics - introduction and overview
- Specification and selection of management systems in production and logistics The role of Artificial Intelligence in management systems today and tomorrow Artificial Intelligence tools to support market search and market analysis - AI workshop
- Creativity techniques, creative future-oriented thinking, development of visions on the future of production and logistics management - creativity workshops

CU2: XR technologies in logistics and supply chain management (2.5 ECTS)

- Introduction to XR technologies - overview, kind of realities, technical solutions (products), main functionalities (how do they work)
- XR technologies and their role in management systems in LSCM
- State-of-the-art of XR technologies - use cases to support LSCM
- Gather practical experiences:

- 3D objects in XR - how to create 3D objects and their physical characteristics in XR?
- Data & dashboards - what can/should be represented in/from a management system in which way?
- Collaboration in/with XR technologies - nice gimmick or substantial support of human interaction and decision making in logistics and supply chain management?
- How XR technology might advance: current developments and future trends
- Chances and challenges, opportunities and threads of XR support in LSCM

CU3: AI application in logistics and supply chain management (2.5 ECTS)

- Fundamentals of AI in logistics and supply chain management: Supervised and unsupervised learning, regression, classification, and clustering problems
- Example applications that can (and cannot) be supported by AI
- Data preparation, exploration, visualisation, and feature selection using Python
- Application of selected machine-learning algorithms to logistics and supply chain problems
- Training, testing and validation of machine-learning models including interpretation of model results and assessment of their usefulness
- Development, documentation, presentation and evaluation of a small AI-based prototype for a selected logistics management application

Learning activities and methodology

Title	Hours	ECTS	Learning outcomes
CU1. Practical training	20	0.8	CA23, SA32, SA34
CU2. Laboratory work	10	0.4	CA21, CA22, CA23, SA33
CU2. Theory lectures	15	0.6	CA21, CA23, SA33, SA34
CU1. Laboratory work	5	0.2	CA23, KA26, SA32
CU2. Practical training	5	0.2	CA22, CA23, SA33, SA35
CU3. Self-learning	29.5	1.18	CA21, KA26, SA32, SA34
CU1. Case study	32	1.28	CA23, SA32, SA34, SA35
CU2. Self-learning	31.5	1.26	CA21, KA26, SA32, SA33
CU1. Self-learning	45	1.8	KA26, SA32, SA34
CU1. Theory lectures	20	0.8	CA23, KA26, SA32, SA34, SA35
CU3: Theory lectures	10	0.4	CA21, CA22, CA23, KA26, SA32, SA34
CU3: Laboratory work	12.5	0.5	CA21, CA22, CA23, SA32, SA34
CU3. Case study	5	0.2	CA21, CA22, CA23, SA32, SA34
CU3. Practical training	2.5	0.1	

CU1: Management system specification in production and logistics (5 ECTS)

The course is organized by means of traditional lectures combined with seminars and practical work. The learning process will combine the following activities:

- Classroom sessions: include theory lectures. Aim to understand specific requirements of logistics and

production management and their complexity; understand specification needs and market situation of typical categories of management systems in production and logistics; specify and formalize requirements for a logistics/production management and control system; explain procedure, methods, and tools for specifying, selecting, implementing, testing and analysing management systems in production and logistics.

- Workshop: discussion on how Artificial Intelligence tools can support market search and analysis; practical training on the application of creativity techniques in teams
- Lab sessions: include demonstrations, experiments in physical environment, classroom discussions. Aim to understand challenges, elements and solutions for managing and controlling production and logistics.
- Case study: group work, student presentation. Aims to (i) apply procedures, methods, and tools for specifying requirements for management systems in production and logistics; (ii) identify and apply criteria for selecting management systems; (iii) elaborate solid arguments to convince and motivate decision makers; (iv) run and manage a management system specification project in order to prepare for respective purchasing activities; (v) create a vision on management systems of the future.
- Autonomous work: reading, self-testing, reflecting. Retrieve and analyse information from different sources; reflect learning and problem solving processes in order to derive lessons learned.

CU2: XR technologies in logistics and supply chain management (2.5 ETCS)

The course is organized by means of traditional lectures combined with practical work. The learning process will combine the following activities:

- Classroom sessions: include theory lectures. Aim to understand kinds of XR technologies, their basic functionality, applicability as entities in cyber-physical systems and connected to logistics management and control systems
- Lab sessions: include demonstrations, experiments in physical environment, classroom discussions. Aim to understand chances and challenges related to applying XR technologies in logistics management and control
- Autonomous work: reading, self-testing, reflecting. Retrieve and analyse information from different sources; reflect learning and problem-solving processes in order to derive lessons learned.

CU3: AI application in logistics and supply chain management (2.5 ECTS)

The course is organized by means of traditional lectures combined with practical work. The learning process will combine the following activities:

- Classroom sessions: include theory lectures and demonstrations. Aim to differentiate between supervised and unsupervised machine learning; classify logistics management problems as regression, classification and clustering tasks; analyze applications that can (or cannot) supported by AI; explain the principles, applications areas, and limitations of machine learning algorithms in logistics management systems
- Lab sessions: include guided programming exercises, experiments with logistics/ supply chain management datasets, demonstrations using Jupyter Notebook or Google Colab, project work, and discussion of results. Aim to prepare and analyse logistics data; assess the effects of prediction errors; develop, document, and present a small AI-based prototype for a selected logistics management problem
- Autonomous work: reading, self-testing, reflecting. Retrieve and analyse information from different sources; reflect learning and problem-solving processes in order to derive lessons learned

Annotation: within the schedule set by the centre or degree programme, 15 minutes of one class will be reserved for students to evaluate their lecturers and their courses or modules through questionnaires.

Assessment

Continuous assessment activities

Title	Weight	Hours	ECTS	Learning outcomes
Final exam (CU1, CU2, CU3)	45%	3	0.12	CA21, KA26, SA32, SA33
CU3. Case study presentation and results	17,5%	2	0.08	CA22, CA23, SA32, SA34, SA35
CU1. Case study presentation and results	37,5%	2	0.08	CA23, KA26, SA32, SA34, SA35

CU1: Management system specification in production and logistics (5 ECTS)

- Case study - part A. Student teams run a market analysis on Manufacturing Execution Systems (MES), Shop floor Management Systems (SFMS), Management Information Systems (MIS), or Customer Information Systems (CIS) using AI-based tools like ChatGPT in order to analyse market situation and derive functional specification of the given class of management systems. Results are summarized in a meaningful, illustrative PowerPoint presentation and presented towards potential decision makers, i.e. other students (peer review).
- Case study - part B. Student teams analyse chances and challenges from digitalization, Industry 4.0, Artificial Intelligence etc. on the class of management systems given in order to characterize the impact latest technological developments might have on user/functional requirements for management systems in production and logistics and their identification/specification. Here, looking into future and developing visionary scenarios concerning the given class of management systems is of particular importance. Results are summarized in a meaningful, illustrative PowerPoint presentation for potential decision makers, i.e. other students (peer review), followed by a wide discussion of the ideas.

CU3: AI application in logistics and supply chain management (2.5 ECTS)

- Case study. Student teams are assigned a logistics or supply chain management problem for which AI can support decision-making. The teams define the problem, develop a small AI-based prototype using Python, and evaluate its usefulness for the underlying decision. The prototype must apply at least one basic machine-learning algorithm covered in the course. The results are documented in an executable and clearly structures Jupyter Notebook and summarised in a presentation.

CU1, CU2 and CU3

The module concludes with a final (written) exam comprising questions and small cases concerning theoretical and practical knowledge on specification and evaluation of logistics management and control systems as being addressed in all three course units from different perspectives. Students are expected to show their understanding on both course-specific aspects and combined views on the overall topic of the entire module. Share of questions expressed by points to be achieved corresponds to the share of each course on module ECTS and weight of the final exam per course.

The student passes the module if case studies and final exam are evaluated "sufficient" (grade 4.0 corresponding to a minimum of 50% of the maximum performance per evaluation activity) at least. The student fails if performance in at least one of the evaluation activities does not reach the 50% threshold or if case study results are not submitted within the due date specified by the lecturer.

In case of fail the student needs to retake just that part of module exam s/he failed. The decision about this is in hands of the examiners. If case study is failed, the student (team) will either be provided with a new case study or asked to re-submit case study results according to the corrections/indications provided by the examiner.

Students who fail an exam may be permitted the opportunity to retake this examination twice at a maximum. After that his/her right for examination terminates. Retaking an exam is allowed only in case the student previously failed, but not to improve grades achieved so far.

Examination dates are announced in due time, but at least two weeks prior to the respective exam. Submission deadlines for practical assignments case studies results and any presentation activities related to them are announced when giving assignments/case studies to students. The final exam and a first opportunity for eventually retaking it are scheduled within specified examination periods. Specific examination dates are published on the university's website.

The weights of each evaluation activity are given in the table below.

Bibliography

To be provided during lecturing period

Software

To be provided during lecturing period

Course groups and languages

The information provided is provisional until November 30. After this date, you will be able to consult the language of each group through this [link](#). To access the information, you will need to enter the course CODE