UAB
Universitat Autònoma de Barcelona

Materials Handling and Transportation Technologies

Code: 44762
ECTS Credits: 6

2025/2026

Degree	Type	Year
Logistics and Supply Chain Management	OB	1

Contact

Name: Juan Jose Ramos Gonzalez

Email: juanjose.ramos@uab.cat

Teachers

(External) Dr.sc.ing Antons Patļins

(External) Prof. Andrejs Romāanovs (main contact: Andrejs. Romanovs@rtu.lv)

(External) Prof. Gaby Neumann

Teaching groups languages

You can view this information at the of this
document.

Prerequisites

None

Objectives and Contextualisation

After the course students are expected to be able:

- to analyse material transport systems (construction features, facilities and equipment). to analyse material storage systems (construction features, facilities and equipment).
- to explain material unitizing procedures and security requirements in material handling system. to use material identification systems
- to select the most appropriate means of transport for cargo transportation
- to create and analyse the main transport documents for cargo transportation
- to understand parameters that influence the efficiency of the material handling and transportation system

Learning Outcomes

1. CA11 (Competence) Tackle LSCM challenges holistically, taking into account the technological considerations and the suitability and performance of the materials handling technologies being used.
2. CA12 (Competence) Specify the requirements for operation, performance and automation technologies needed in material handling and conveyor systems.
3. KA14 (Knowledge) Explain material unification procedures and safety requirements in material handling systems.
4. KA15 (Knowledge) Define the operating principles, operating modes, application limitations and opportunities for automation in material handling and transport.
5. KA16 (Knowledge) Identify typical material handling techniques in logistics.
6. KA17 (Knowledge) Identify the parameters that influence the efficiency of material handling and transport systems.
7. SA18 (Skill) Apply methods to calculate material handling performance.
8. SA19 (Skill) Analyse material transport and storage systems (building characteristics, facilities and equipment).

Content

The course demonstrates the basic principles of cargo handling and transportation, provides the classification of equipment intended for cargo handling and transportation (cargo gripping mechanisms, devices for removing cargo, belt conveyors, cargo transfer equipment, dedicated devices, etc.). The course also considers the issues of storage facility organization, purposes and functions. It describes possible mechanical and automated equipment for material handling operations. It describes also material unitizing procedures and security requirements in material handling system. Students are also introduced to the main cargo labellingand identification systems. During the course students have at least one - two industrial visits, if there would not be any official restrictions and limitations for group meetings.

List of topics/themes/sessions:

- General description of transport systems;
- Combined transport systems;
- Characteristics of cargo units;
- Cargo packaging;
- Containerization;
- Labelling and identification of cargo units in logistic systems;
- Basic principles of cargo handling, cargo handling systems;
- Functions and objectives of transport terminals and warehouses;
- Structure, description and costs of operations at transport terminals and warehouses;
- Piece goods handling terminals. Liquid cargo handling terminals. Bulk cargo handling terminals;
- Mechanical and automated equipment for implementing technological processes at transport terminals and warehouses;
- Characteristic elements of mechanical and automated equipment. Classification of load lifting and transportation machine;
- Flexible elements (chains, ropes, cables) of load lifting machines. Load-grappling devices. Rope pulley blocks. Brakes;
- Mechanical equipment for transport works. Simple lifting mechanisms. Pullers;
- Load lifting mechanisms;
- Cranes. Cantilevers and bridge cranes; Loaders. Container loaders;
- Automated equipment for transport works. Classification and characteristics of continuous machines;
- Belt conveyors and specialized equipment. Conveyors and shifting machines;
- Gravity transfer devices;
- Estimation of productivity of transport machines;
- Operating safety of cargo loading equipment. Methods and devices for the diagnostics of vehicle loading equipment;
- Design of cargo handling systems.
- Performance calculation in intralogistics.

Activities and Methodology

Title	Hours	ECTS	Learning Outcomes
Type: Directed			
Practical sessions	20	0.8	
Theory lectures	45	1.8	
Type: Supervised			
Student presentations	24	0.96	
Type: Autonomous			
Mastering in the lectured course material	38	1.52	
Study project	20	0.8	

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

- Theory lectures: Understanding the material handling and transportation system
- Practical sessions: Small group sessions in applying theoretical concepts (exercises and problems). Student presentations: Analytical work with scientific literature and other sources of information.
- Structuring information about the specific topic with practical examples.
- Study project: Performance calculations in intralogistics. Material flow analysis in a production company.
- Autonomous work

Use of Generative Artificial Intelligence Tools - Policy Statement

In this subject, the use of Artificial Intelligence (AI) technologies is permitted as a distinct and integrated part of the development process, provided that the final outcome demonstrates a substantial contribution from the student in terms of analysis and personal reflection.

Students must clearly identify the portions of their work that have been generated using AI tools, specify the technologies employed, and include a critical reflection on how these tools have influenced both the process and the final outcome of the activity.

A lack of transparency regarding the use of AI will be considered a breach of academic integrity and may result in a grade penalty for the assignment. In more serious cases, further academic sanctions may apply.

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

Continous Assessment Activities

Title	Weighting	Hours	ECTS	Learning Outcomes

Oral exam	40%	2	0.08	CA11, CA12, KA15, KA16, SA18
Practical exercises	20%	0	0	CA11, KA14, KA16, KA17, SA18, SA19
Student presentations	10%	1	0.04	CA11, CA12, KA15, KA16, SA19
Study project	30%	0	0	CA11, CA12, KA15, KA16, KA17, SA18, SA19

The final grade will be calculated from the assessment of different evaluation activities:

- Study project: Performance calculations in intralogistics. Material flow analysis in a production company.
- Practical exercises: Practical in class exercises on the topics discussed during lectures
- Student presentations: Individual small oral presentations of the given research topic
- Oral exam. Students have to answer theoretical questions and solve case studies on the topics discussed during lectures

In order to average all the evaluation activities, the mark of each of them must be above 4 points (out of 10). All the report-based activities must be submitted within the due dates specified by the professor. If a report-based activity is failed, the student will be asked to re-submit the report according to the corrections/indications provided by the professor. If the exam is failed, the student will have the opportunity to retake it. The dates for retaking an exam will be communicated to the student well in advance.

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

Bibliography

1. International Freight Forwarders. - Can_Ship Overseans Inc., Canada,Toronto.-2003.
2. Johnson, J. Williams,. Modern Logistics. Institute of Oriental Studies, 2005. - 624 p.
3. Mahoney John H. International freight transportation connections.- Westpoint, Connecticut, USA, 1999.
4. BauerAngela. Lagermodellierung für logistische Netze. Dt. Verkehrs-Verl., ISBN: 3871542725, 2002, 234 p.
5. Bode, W.; Preuß, R.W.: Comprehensive introduction to intralogistics. A reference book by the STILL Akademie 2005.
6. Askin, R.G.; Standridge, C.R.: Modeling and analysis of manufacturing systems; John Wiley &Sons 1993.
7. Tompkins, J.; White, J.; Bozer, Y.; Frazelle, E.; Tanchoco, J.; Trevino, J.: Facilities Planning; 4. ed.; John Wiley&Sons: New York, 2010.
8. Frazelle, E: World-class Warehousing And Material Handling; McGraw-Hill, USA, 2002
9. Harrison, A.; Hoek, R.: Logistics Management and Strategy. Competing through the Supply Chain, 3rd edition, FT Prentice Hall, 2008
10. Price,P.M.; Harrison, N.J.: Warehouse Management And Inventory Control; 2nded.; Access Education USA, 2015.

Software

No specific S/W is foreseen

Groups and Languages

Please note that this information is provisional until 30 November 2025. You can check it through this link. To consult the language you will need to enter the CODE of the subject.