Universitat Autònoma de Barcelona

Material Handling and Transportation Technologies 2016/2017

Code: 42651
ECTS Credits: 6

Degree	Type	Year	Semester
4313489 Logistics and Supply Chain Management	OB	1	2

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Use of languages

Principal working language: english (eng)

Prerequisites

None

Objectives and Contextualisation

The course considers the issues related to material handling and transportation technologies.

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 understand parameters that influence the efficiency of the material handling and transportation system

Skills

- Address problems of management and coordination of logistics operations in production, transport and services in a holistic approach, by means of the consistent application of the supply chain management concepts and strategies, taking into account the pertinent aspects of environment, human capital, quality, technology, and economics.
- Analyse, organise and discuss situations in logistics in order to identify and model the dependency relationships, influence and impact that usually occur in the main performance indicators and quality factors as well as evaluating their complexity.
- Demonstrate abilities in oral and written communication both in the student's native language and in English. Demonstrate synthesis skills and ability in presentation techniques.
- Demonstrate information management skills: ability to retrieve and analyse information from different sources.
- Possess and understand knowledge that provides a basis or opportunity for originality in the development and/or application of ideas, often in a research context
- Select and apply the most relevant analytical methodologies, strategies and current technologies for designing solutions to the problams of management and coordination of material, information and financial flows.
- Student should possess an ability to learn that enables them to continue studying in a manner which is largely self-supervised or independent
- Work collaboratively in a group.

Learning outcomes

1. Address LSCM problems by using a holistic approach, taking into account technological aspects, such as the suitability and performance of technologies in material handling being used.
2. Demonstrate abilities in oral and written communication both in the student's native language and in English. Demonstrate synthesis skills and ability in presentation techniques.
3. Demonstrate information management skills: ability to retrieve and analyse information from different sources.
4. Identify material handling problems and specify requirements for MHT functionality, performance and automation technologies.
5. Know and apply methods to calculate materials handling performance.
6. Possess and understand knowledge that provides a basis or opportunity for originality in the development and/or application of ideas, often in a research context
7. Student should possess an ability to learn that enables them to continue studying in a manner which is largely self-supervised or independent
8. Understand the typical materials handling techniques in logistics.
9. Understand the working principles, operational modes, application constraints and automation opportunities in material handling and transport.
10. Work collaboratively in a group.

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 labelling and identification systems.

List of topics:

- 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 conveyorsand 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

Methodology

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

Activities

Title	Hours	ECTS	Learning outcomes
Type: Directed			
Practical sessions	20	0.8	1, 3, 4, 6, 8, 9, 10
Theory lectures	45	1.8	1, 4, 5, 8, 9
Type: Supervised			
Student presentations:	24	0.96	1, 2, 3, 4, 8, 9
Type: Autonomous			
Mastering in the lectured course material	38	1.52	1, 3, 4, 5, 7, 8, 9
Study project	20	0.8	3, 5, 6, 7, 10

Evaluation

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
- Written 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.

Evaluation activities

Title	Weighting	Hours	ECTS	Learning outcomes
Practical exercises	20%	0	0	1, 3, 4, 6, 8, 9, 10
Student presentations	15%	1	0.04	1, 2, 3, 4, 8, 9
Study project	20%	0	0	3, 5, 6, 7, 10
Written exam	45%	2	0.08	1, 2, 4, 5, 8, 9

Bibliography

1. International Freight Forwarders. - Can_Ship Overseans Inc., Canada,Toronto.-2003.
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4. Bauer Angela. Lagermodellierung für logistische Netze. Dt. Verkehrs-Verl., ISBN: 3871542725, 2002, 234 p.
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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.