

Academic Year: ( 2023 / 2024 )

Review date: 27-04-2023

Department assigned to the subject: Mechanical Engineering Department

Coordinating teacher: DURAN HERAS, ALFONSO

Type: Electives ECTS Credits : 6.0

Year : 4 Semester :

**REQUIREMENTS (SUBJECTS THAT ARE ASSUMED TO BE KNOWN)**

Supply Chain Management I

Engineering Management I (to a lesser extent)

Students that did not take SCM I will require substantial extra effort in order to properly follow SCM II

**SKILLS AND LEARNING OUTCOMES**

CB1. Students have demonstrated possession and understanding of knowledge in an area of study that builds on the foundation of general secondary education, and is usually at a level that, while relying on advanced textbooks, also includes some aspects that involve knowledge from the cutting edge of their field of study

CB2. Students are able to apply their knowledge to their work or vocation in a professional manner and possess the competences usually demonstrated through the development and defence of arguments and problem solving within their field of study.

CB3. Students have the ability to gather and interpret relevant data (usually within their field of study) in order to make judgements which include reflection on relevant social, scientific or ethical issues.

CB5. Students will have developed the learning skills necessary to undertake further study with a high degree of autonomy.

CG1. Ability to solve problems with initiative, decision-making, creativity, critical reasoning and to communicate and transmit knowledge, skills and abilities in the field of Industrial Engineering.

CG3. Ability to design a system, component or process in the field of Industrial Technologies to meet the required specifications

CG4. Knowledge and ability to apply current legislation as well as the specifications, regulations and mandatory standards in the field of Industrial Engineering.

CG5. Adequate knowledge of the concept of company, institutional and legal framework of the company. Organisation and management of companies.

CG6. Applied knowledge of company organisation.

CG8. Knowledge and ability to apply quality principles and methods.

CG9. Knowledge and ability to apply computational and experimental tools for the analysis and quantification of Industrial Engineering problems.

RA1. Knowledge and understanding: Have basic knowledge and understanding of science, mathematics and engineering within the industrial field, as well as knowledge and understanding of Mechanics, Solid and Structural Mechanics, Thermal Engineering, Fluid Mechanics, Production Systems, Electronics and Automation, Industrial Organisation and Electrical Engineering.

RA2. Engineering Analysis: To be able to identify engineering problems within the industrial field, recognise specifications, establish different resolution methods and select the most appropriate one for their solution

RA3. Engineering Design: To be able to design industrial products that comply with the required specifications, collaborating with professionals in related technologies within multidisciplinary teams.

RA5. Engineering Applications: To be able to apply their knowledge and understanding to solve problems and design devices or processes in the field of industrial engineering in accordance with criteria of cost, quality, safety, efficiency and respect for the environment.

**OBJECTIVES**

Identify the main challenges and solution approaches in integrated Supply Chain Management, including the application of Information Systems.

Establish the most appropriate manufacturing planning and control systems for the various types of companies.

Relate product and company traits to the most appropriate layout.

Application of the Lean approach in the design and operation of the productive and logistic systems, and compare them with alternative approaches.

Apply the basis elements of warehouse management.

## DESCRIPTION OF CONTENTS: PROGRAMME

IMPORTANT NOTICE: In the academic year 2023/24 (as since 21/22) this subject will be taught online

Subjects SCM I and SCM II have been selected in the "1ª Convocatoria de Aprendizaje Activo en Docencia Digital (Active Learning in Digital Education)", thus they will be taught entirely online (except the midterm tests and the final exam, and eventually lab sessions), through platforms such as BBC and/or Engageli. Thus, students enrolling in any of these elective courses must regularly attend the sessions (online; activating camera and microphone), and adhere to an active methodology, involving continuous individual and group work, as preparation and complement of the online sessions. Session recording is not currently planned; individual recording is forbidden unless explicitly authorized. Given the innovative and exploratory nature of this call ("Convocatoria"), by enrolling in these elective courses students accept that the (anonymized) results of these courses (academic results, surveys, experiences...) might be used for research and/or learning methodology development purposes, and eventually disseminated (e.g. in Education conferences, journals,...)

- \* Introduction. Evolution. Representation, flows, balancing.
- \* Production Management
  - \*\* Product-process matrix
  - \*\* Lay-out and production processes typology
  - \*\* Group Technology and flexible manufacturing cells
- \* Lean Production (I)
  - \*\* Pillars of the Lean approach
  - \*\* Jidoka. Early defect detection
  - \*\* Kaizen, continuous improvement
- \* Just In Time (JIT) and pull systems
  - \*\* Pull vs Push
  - \*\* Dual role of the inventory
  - \*\* Variability reduction
  - \*\* Kanban
- \* Service Level Management in SCM
  - \*\* KPIs
  - \*\* Warehouse management
- \* Information Systems (IS) in SCM
  - \*\* Logistic IS. Typology
  - \*\* Digitalization. Robotics. Connected Industry 4.0
- \* Integrated SCM
  - \*\* Order and materials flow. Inventories and safety stocks
  - \*\* Procurement and supplier management
  - \*\* Product and service design. Service companies
  - \*\* Project management
  - \*\* SC strategic implications. Outsourcing. Sustainability and circularity. Politics and the SC

## LEARNING ACTIVITIES AND METHODOLOGY

Learning activities include:

- Lectures, tutoring sessions, student presentations, individual and group work by the students, including information retrieval and analysis, study, exams, and tests aimed at the acquisition of theoretical knowledge.
- Practical sessions, case discussions and problem solving, tutoring, and individual work by the students, including study, exams, and tests aimed at the acquisition of applied practical knowledge within the course's domain. Practical sessions might encompass:

- \* Simulations
- \* Case analysis
- \* Group work

Please see "Important Notice" in "Program": In the academic year 2023/24 they will take place online (except the midterm and the exam, and eventually specific practical activities)

## ASSESSMENT SYSTEM

60% Final written exam.

40 % Continuous evaluation. Partial exam(s) will be held. Optionally, complementary evaluation system. May apply sampling based grading.

See "Important Notice" in the "Program" section, regarding active online methodology

Minimum grade required in the final exam: 4

(Notice: optionally for the students, the instructor might offer voluntary continuous evaluation alternatives involving a weight above 40%)

<b>% end-of-term-examination:</b>	60
<b>% of continuous assessment (assignments, laboratory, practicals...):</b>	40

#### BASIC BIBLIOGRAPHY

- Bozarth, C; Handfield, R Introduction to Operations and Supply Chain Management, Pearson, 2019
- Chopra, S. Supply Chain Management: Strategy, Planning, and Operation, Pearson, 2019
- Simchi-Levi, D., P. Kaminsky, E. Simchi-Levi Designing and Managing the Supply Chain: Concepts, Strategies and Case Studies, McGraw-Hill, 2021 (4th Edition)

#### ADDITIONAL BIBLIOGRAPHY

- Goldratt, E., Cox, J. The Goal: A Process of Ongoing Improvement , Gower Publishing Ltd, 2004, 3rd Revised edition
- Jacobs, F.R.; Chase, R.B.; Aquilano, N.J. Operations and supply chain management, McGraw-Hill, 2023
- Schroeder, R.; Goldstein, S.M. Operations management in the supply chain. Decisions and cases, McGraw-Hill, 2019