



Course guide

240774 - 240774 - Production and Operations Management

Last modified: 16/05/2023

Unit in charge: Barcelona School of Industrial Engineering
Teaching unit: 732 - OE - Department of Management.

Degree: BACHELOR'S DEGREE IN INDUSTRIAL TECHNOLOGIES AND ECONOMIC ANALYSIS (Syllabus 2018).
(Compulsory subject).

Academic year: 2023 **ECTS Credits:** 6.0 **Languages:** English

LECTURER

Coordinating lecturer: Manel Mateo Doll

Others: Mateo Doll, Manuel
Argelich Hernández, David
Moliné Boixareu, Joan Ignasi
Gras Basañez, Iñaki

DEGREE COMPETENCES TO WHICH THE SUBJECT CONTRIBUTES

Specific:

CEGTI20. (ENG) Coneixement aplicat de l'enginyeria i la mineria de dades i anàlisi de quantitats massives de dades.
CEGTI 6. (ENG) Coneixement d'organització i gestió d'empresa i optimització de processos i productes.

TEACHING METHODOLOGY

The ECTS credits of the subject are 6 (60 hours of face-to-face class for theory, theoretical application activities and practices; 150 hours of student work devoted to the subject).

The course consists of the following training activities:

- o Theoretical sessions. A part of these sessions corresponds to a master class (lectures) or to solve doubts or give explanations on knowledge worked in advance. And the rest is devoted to participatory-guided classes.
- o Practical sessions. They correspond to a laboratory class where the students in groups of 3 or 4 apply quantitative tools in order to understand how to apply the procedures introduced in lectures.
- o This is complemented by self study on concepts and exercises; this activity is distance learning.
- o Finally, we consider the evaluation activities (mid-term exam, practical exam and final exam).

LEARNING OBJECTIVES OF THE SUBJECT

The main objective is to introduce a set of decisions related to manufacturing and logistics management in the supply chain, focussed on the operations management, and provide a basic conceptual view and some elementary management tools. At the end of the course, the student is expected to be able to:

- o Identify the types of problems in management of the manufacturing and logistics systems and developing the appropriate procedures of resolution to provide feasible and reasonable solutions.
- o Identify which decisions to take in the short-term and medium-term in the behaviour of industrial engineering (Operations Management) and the most common criteria.
- o Use the appropriate quantitative techniques to support the decision making, specially in data management.
- o Develop the ability of reasoning in real situations of management.
- o Manage several kinds of manufacturing and logistics systems (goods or services, product-focused or process-focused ...).



STUDY LOAD

Type	Hours	Percentage
Self study	90,0	60.00
Hours large group	60,0	40.00

Total learning time: 150 h

CONTENTS

TOPIC 1. Introduction

Description:

Definition of production, manufacturing and logistic system, supply chain. Product and layout. Management decisions: design decisions and operations management decisions.

Specific objectives:

Identify the managerial characteristics for different organizations and in particular for manufacturing and logistics systems. Place each of the decisions on manufacturing and logistics systems in the general scheme of decision making. Describe a product according to their characteristics.

Related activities:

Theoretical lecture.
A short-duration activity in theory class to reinforce the concepts.

Full-or-part-time: 6h

Theory classes: 2h
Practical classes: 2h
Self study : 2h

TOPIC 2. Costs and investments

Description:

Costs. Classification of costs. Break-even point. Productivity. Process capacity. Investments: cash-flows and evaluation of investments (NPV, IRR, pay-back).

Specific objectives:

Classify the costs involved in a management decision.
Determine the best investment options from one or more criteria.

Related activities:

Theoretical lecture.
A short-duration activity in theory class to reinforce the concepts.
Exercise.

Full-or-part-time: 6h

Theory classes: 2h
Practical classes: 2h
Self study : 2h



TOPIC 3. Inventory management

Description:

Definition of inventory, classification and costs. Inventory management. ABC analysis. Deterministic models: EOQ formula; simultaneous supply and usage; quantity discounts; case of several items; manufacturing several articles in a single machine; non-homogeneous demand.

Specific objectives:

Identify the different types of costs and elements to be considered in inventory management.
Solve a situation of inventory management in a deterministic context, using the appropriate model.
Identify the relevance of each product in a global context.

Related activities:

Theoretical lecture.
A short-duration activity in theory class to reinforce the concepts.
Exercise.

Related competencies :

CEGTI 6. (ENG) Coneixement d'organització i gestió d'empresa i optimització de processos i productes.

Full-or-part-time: 24h

Theory classes: 6h
Practical classes: 4h
Self study : 14h

TOPIC 4. Operations planning

Description:

Concept and levels of planning. Characteristics of a production plan. The Master Production Schedule (MPS). Determination of a MPS: graphical analysis, intuitive analysis, analytical models (Bowman's method). Distribution planning.

Specific objectives:

Identify the elements to be considered in planning (demand, capacity and costs).
Develop a Master Production Schedule intuitively or optimally.

Related activities:

Theoretical lecture.
A short-duration activity in theory class to reinforce the concepts.
Exercise.

Related competencies :

CEGTI 6. (ENG) Coneixement d'organització i gestió d'empresa i optimització de processos i productes.

Full-or-part-time: 24h

Theory classes: 4h
Practical classes: 4h
Self study : 16h



TOPIC 5. Requirements planning

Description:

General considerations in requirements planning. Product structure: bill of materials. Material Requirements Planning (MRP) and Capacity Requirements Planning (CRP). MRP-II. Distribution Requirements Planning (DRP).

Specific objectives:

Understand the BOM of a product.

Determine the supply and manufacturing orders to meet a plan.

Determine the amount of resources required for manufacturing and distribution.

Related activities:

Theoretical lecture.

A short-duration activity in theory class to reinforce the concepts.

Exercise.

Full-or-part-time: 17h

Theory classes: 3h

Practical classes: 2h

Self study : 12h

TOPIC 6. Data management

Description:

Sales & Operation Planning (S&OP). Introduction to Data Management. Tools and techniques. Examples and practical cases.

Specific objectives:

Know how the S&OP works.

Apply data management tools to case studies in planning.

Related activities:

Theoretical lecture.

A short-duration activity in theory class to reinforce the concepts.

Exercise.

Related competencies :

CEGTI20. (ENG) Coneixement aplicat de l'enginyeria i la mineria de dades i anàlisi de quantitats massives de dades.

Full-or-part-time: 40h

Theory classes: 6h

Practical classes: 9h

Self study : 25h



TOPIC 7. Operations scheduling

Description:

Assignment, sequencing, timing. Classification of problems. Notation. One single machine. Criteria for sequencing. The flow-shop problem: exact procedure (2 machines) and heuristics (more than 2 machines). The job-shop. The dispatching methods.

Specific objectives:

Determine the type of flow in a given production system.

Determine a schedule for manufacturing operations, using the appropriate procedure.

Related activities:

Theoretical lecture.

A short-duration activity in theory class to reinforce the concepts.

Exercise.

Full-or-part-time: 23h

Theory classes: 5h

Practical classes: 4h

Self study : 14h

TOPIC 8. Global management in the organizations

Description:

Release and control: productivity and KPI. Lean Management and Just In Time, and their management tools. ERPs and implementation. Evolution: continuous improvement and reengineering.

Specific objectives:

Identify areas of improvement in methods of work.

Acquire a vocabulary of concepts used in management (ERP, TQM, JIT, TOC, B2B...).

Full-or-part-time: 10h

Theory classes: 2h

Practical classes: 3h

Self study : 5h

GRADING SYSTEM

The evaluation is done by several ways:

- (1) a final exam (EF) with a maximum of 3 hours duration, consisting of several theoretical and practical exercises in which the student must demonstrate the ability to apply learned knowledge and to develop specific procedures of resolution;
- (2) a mid-term exam (PP) with a maximum of 1h15 'duration, in which the student is basically faced to intellectual agility questions and short exercises;
- (3) an exam about exercises in practical sessions (EP) with a maximum of 1 hour duration, in which the student must demonstrate that he/she is able to solve situations slightly different from those worked out in class;
- (4) evaluation during practical sessions (TP), in which the student must demonstrate his/her progressive learning during practical sessions in response to short answer questions about what to be held by the end of the session;
- (5) evaluation about data management (DM).

The final grade for the course N_{final} will be obtained:

$$N_{final} = 0,5 \cdot N_{af} + 0,1 \cdot N_{dm} + 0,2 \cdot N_{ep} + 0,2 \cdot N_{ac}$$

N_{af} : final exam evaluation

$$N_{af} = EF$$

N_{af} : data management evaluation

$$N_{dm} = DM$$

N_{ep} : practical sessions evaluation

$$N_{ep} = \max \{ EP ; 0,5 \cdot TP + 0,5 \cdot EP \}$$

N_{ac} : progressive learning evaluation

$$N_{ac} = \max \{ PP ; EF \}$$



EXAMINATION RULES.

The final exam (EF), as well as the equivalent reevaluation exam (REA), the practice exam (EP) and the mid-term exam (PP) are openbooks. Electronic devices are not allowed, except pocket calculator (mobile phone or any other devices are not allowed).

The evaluation during practical sessions (TP) will be held answering the requested questions, during each one of the sessions. They will be answered at the end of the corresponding session. It is the responsibility of the student to have the right skills taught in theory and use them fit during the available time. If any trap attempt is detected in the TP evaluation in the practical classes of a subgroup, the qualification will be 0 for all students in that subgroup. Given n practices, the final value for TP will be based on the best $n-1$ marks. The alternative to attend practices, and the mark based on the work done there, is the exam EP. In case of a strike day, if the student does not attend class, his value n will not be reduced in a unit. This will be repeated for each of the strike days that affect some group of practices.

If the student attends to the reevaluation exam, this mark will replace the one obtained in the final exam (EF) if it is higher. In the REA exam, the student must fill out a sheet of answers to the questions proposed. Then:

Naf: final exam evaluation

$$\text{Naf} = \max \{ \text{REA}; \text{EF} \}$$

BIBLIOGRAPHY

Basic:

- Heizer, J. ; Render, B.. Dirección de la producción y de operaciones : decisiones tácticas [on line]. 11a ed. Madrid: Pearson, 2015 [Consultation: 08/11/2021]. Available on: https://www-ingebook-com.recursos/ib/NPcd/IB_BooksVis?cod_primaria=1000187&codigo_libro=5776a. ISBN 9788490352854.
- Heizer, J. ; Render, B.. Dirección de la producción y de operaciones : decisiones estratégicas [on line]. 11a ed. Madrid: Pearson, 2015 [Consultation: 08/11/2021]. Available on: https://www-ingebook-com/ib/NPcd/IB_BooksVis?cod_primaria=1000187&codigo_libro=5779. ISBN 9788490352878.
- Jacobs, F. R.; Chase, R. B. Operations and supply chain management. 16th ed. New York: McGraw-Hill, 2021. ISBN 9781260575941.
- Vollmann, T.E.. Manufacturing planning and control for supply chain management. 5th ed. New York: McGraw-Hill, 2005. ISBN 0072299908.
- Jaggia, S. ; Kelly, A. ; Lertwachara, K. ; Chen, L.. Business Analytics : communicating with numbers. New York: McGraw-Hill, 2021. ISBN 9781260576016.

Complementary:

- Fitzsimmons, James A.. Service management : operations, strategy, and information technology. 8th ed. New York: McGraw-Hill, 2014. ISBN 9781259010651.
- Waller, Derek L.. Operations Management : A Supply Chain Approach. 2a ed. London: Thomson, 2003. ISBN 1861528035.

RESOURCES

Other resources:

- Slides.
- Practice texts.