

Course guide

240EI515 - 240EI515 - Industrial Scheduling

Last modified: 04/07/2023

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

Degree: MASTER'S DEGREE IN INDUSTRIAL ENGINEERING (Syllabus 2014). (Compulsory subject).

Academic year: 2023 **ECTS Credits:** 4.5 **Languages:** Catalan, Spanish

LECTURER

Coordinating lecturer: Alfaro Pozo, Rocío

Others: David Agustin, Rocío Alfaro, Jaume Ferrer-Dalmau, Xavier Garriga, Oscar Gil, Joan Ignasi Moliné, David Palanques

DEGREE COMPETENCES TO WHICH THE SUBJECT CONTRIBUTES

Specific:

CEMEI09. Knowledge and abilities to organise and manage companies.

CEMEI14. Abilities for the organization at work and management of the human resources. Knowledge about prevention of occupational risks.

CEMEI10. Knowledge and strategy and planning abilities applied to different organizational structures.

CEMEI13. Knowledge in information systems for the management, industrial organization, production systems and logistics and quality management systems.

CEMEI15. Knowledge and abilities for the integrated management of projects.

TEACHING METHODOLOGY

The subject will consist of the following training activities:

- * Part of the "theory" sessions corresponds to the master class format (face-to-face or with videos). The rest of the time of the "theory" sessions corresponds to the participatory-directed class format.
- * The "practice" sessions correspond to the laboratory class format, where students apply calculation tools to understand the practical application of the procedures introduced in theory classes.
- * This is complemented by individual and non-contact work of acquisition of theoretical concepts and practical cases.
- * Finally, the evaluation activities are considered (partial tests, internships and final exam).

LEARNING OBJECTIVES OF THE SUBJECT

The decisions associated with the design (configuration, sizing and physical layout), the main problems that are presented in the configuration of a productive and logistic system are studied, and methods and tools are provided to solve them. For this, the basic theme related to the organization of these systems is presented, providing a basic conceptual vision and detailed instrumental elements.

Objectives to achieve:

- * To know the basic scheme of decision-making in the medium-long term (systems design) and locate the problems raised.
- * To know and know how to apply techniques to represent processes of any type.
- * To know and know how to apply techniques to program the activities of a project
- * Be able to analyze various alternatives to the process-oriented layout, considering distances traveled, flows and other additional elements.
- * Be able to design a basic production and assembly line.
- * Be able to apply the appropriate tools (timing, sampling, default systems) to determine the time allotted to tasks.
- * Be able to optimally configure a system formed by elements (e.g., machines) that must be attended by people
- * To know different ways of organizing working time and be able to design systems based on work shifts.
- * Be able to analyze the reliability of a system
- * To know and know how to apply techniques and methods for process improvement
- * To know the basic concepts about the maintenance of elements and systems (predictive, corrective, preventive). To know and to know to solve problems of renovation of elements.

STUDY LOAD

Type	Hours	Percentage
Hours large group	27,0	24.00
Hours small group	13,5	12.00
Self study	72,0	64.00

Total learning time: 112.5 h

CONTENTS

Introduction

Description:

Concepts of production, production system, logistics and supply chain management. Design decisions and operations management.

Related activities:

Theoretical lecture.

Related competencies :

CEMEI09. Knowledge and abilities to organise and manage companies.

CEMEI13. Knowledge in information systems for the management, industrial organization, production systems and logistics and quality management systems.

Full-or-part-time: 1h 20m

Theory classes: 0h 20m

Self study : 1h

Process description and improvement

Description:

Definición de proceso, cálculo de la capacidad de un proceso, técnicas para la representación gráfica y sintética de procesos.

Specific objectives:

Know and know how to apply techniques to represent processes of any type. Know the main techniques for process improvement.

Related activities:

Theoretical lecture.

Short-duration activities.

Exercises.

Related competencies :

CEMEI09. Knowledge and abilities to organise and manage companies.

CEMEI13. Knowledge in information systems for the management, industrial organization, production systems and logistics and quality management systems.

Full-or-part-time: 11h

Theory classes: 2h

Practical classes: 2h

Self study : 7h

Assembly line balancing

Description:

Concepts and techniques for the design of assembly lines

Specific objectives:

Design a basic production and assembly line

Related activities:

Explicació teòrica.

Activitat de curta durada.

Exercicis pràctics.

Full-or-part-time: 12h 30m

Theory classes: 2h 30m

Practical classes: 2h

Self study : 8h

Layout

Description:

Introduction: classification, problems and goals. SLP method to design a plant layout: information collection, multi-product analysis of flows and distances, relationship diagrams, space relational diagrams, evaluation and optimization.

Specific objectives:

Determining one or more alternatives to a layout considering distances, flows and other constraints.

Related activities:

Theoretical lecture.

Short-duration activities.

Exercises.

Related competencies :

CEMEI09. Knowledge and abilities to organise and manage companies.

CEMEI13. Knowledge in information systems for the management, industrial organization, production systems and logistics and quality management systems.

Full-or-part-time: 16h

Theory classes: 4h

Practical classes: 2h

Self study : 10h

Machine assignment

Description:

Introduction. The case of interference. General model for the case of identical machines. Deterministic case. Random case: Ashcroft's model and tables.

Specific objectives:

Determine the time and costs required for the allocation of machines to one or more workers.

Related activities:

Theoretical lecture.

Short-duration activities.

Exercises.

Related competencies :

CEMEI10. Knowledge and strategy and planning abilities applied to different organizational structures.

CEMEI09. Knowledge and abilities to organise and manage companies.

CEMEI13. Knowledge in information systems for the management, industrial organization, production systems and logistics and quality management systems.

Full-or-part-time: 12h 40m

Theory classes: 2h 40m

Practical classes: 2h

Self study : 8h

Study of work time

Description:

Timing (procedure, time units, the concept of activity, scales) and statistical analysis of the results. Sampling. Predetermined time systems; introduction to MTM systems. Organization of working time.

Specific objectives:

Estimate the time of a standard process and the number of observations required to establish a representative time.

Estimate the proportion of working time devoted to an activity.

Determine the time of a process based on predetermined time tables.

Determine the amount of staff and shifts to meet requirements in a service.

Related activities:

Theoretical lecture.

Short-duration activities.

Exercises.

Related competencies :

CEMEI14. Abilities for the organization at work and management of the human resources. Knowledge about prevention of occupational risks.

CEMEI10. Knowledge and strategy and planning abilities applied to different organizational structures.

CEMEI09. Knowledge and abilities to organise and manage companies.

CEMEI13. Knowledge in information systems for the management, industrial organization, production systems and logistics and quality management systems.

Full-or-part-time: 7h 30m

Theory classes: 2h 30m

Self study : 5h

Working time organization

Description:

Systems of organization of working time. Shift work.

Specific objectives:

Know different ways of organizing working time and be able to design systems based on work shifts.

Related activities:

Theoretical explanation.

Short-term activity.

Practical exercises.

Full-or-part-time: 12h 40m

Theory classes: 2h 40m

Practical classes: 2h

Self study : 8h

Project management

Description:

Definition. Several kinds of time constraints: cumulative, disjunctive... Treatment of disjunctions and resources' limitations. Economic management of the project. Project organization and control.

Specific objectives:

Determine the duration of a project depending on the amount of financial resources provided.

Related activities:

Theoretical lecture.
Short-duration activities.
Exercises.

Related competencies :

CEMEI15. Knowledge and abilities for the integrated management of projects.
CEMEI09. Knowledge and abilities to organise and manage companies.

Full-or-part-time: 6h

Theory classes: 2h
Self study : 4h

Reliability

Description:

Analysis and calculation of the reliability of a system..

Specific objectives:

Be able to analyze the reliability of a system.

Related activities:

Theoretical lecture.
Short-duration activities.
Exercises.

Related competencies :

CEMEI09. Knowledge and abilities to organise and manage companies.
CEMEI13. Knowledge in information systems for the management, industrial organization, production systems and logistics and quality management systems.

Full-or-part-time: 7h 40m

Theory classes: 2h 40m
Self study : 5h

Maintenance and renewal

Description:

Maintenance and renewal

Specific objectives:

To know the basic concepts about the maintenance of elements and systems (predictive, corrective, preventive). To know and to know to solve problems of renovation of elements.

Related activities:

Theoretical lecture.

Short-duration activities.

Exercises.

Full-or-part-time: 12h 40m

Theory classes: 2h 40m

Practical classes: 2h

Self study : 8h

Additional

Description:

content english

Full-or-part-time: 12h 30m

Theory classes: 3h

Practical classes: 1h 30m

Self study : 8h

GRADING SYSTEM

The evaluation takes into account the following elements:

(1) a mid-course exam (E1), lasting a maximum of 1h15 '. This test assesses the topics that all groups have completed by the date of the test and can include questions about the practices.

(2) a test at the end of the course (E2), with a maximum duration of 2h30 '. In this test the subjects that do not enter the first test are evaluated and questions about the practices can enter.

The final grade of the Nfinal subject will be calculated:

$$N_{\text{final}} = 0.3 \cdot E1 + 0.7 \cdot E2$$

In the event that the student takes the re-assessment of the subject, the mark obtained in this exam will be directly the final mark of the subject.

EXAMINATION RULES.

All the material of the subject can be carried out in all the written exams. Only the use of a calculator is allowed within the electronic material (no mobile phone or other tool other than the calculator can be available).

BIBLIOGRAPHY

Basic:

- Chase, Richard B; Jacobs, F. Robert. Administración de operaciones : producción y cadena de suministros [on line]. 15a ed. México [etc.]: McGraw Hill, 2019 [Consultation: 20/04/2020]. Available on: <https://ebookcentral-proquest-com.recursos.biblioteca.upc.edu/lib/upcatalunya-ebooks/detail.action?pq-origsite=primo&docID=5611013>. ISBN 9781456261412.
- Fitzsimmons, James A. Service management : operations, strategy, information technology. 8th ed. New York: McGraw-Hill, 2014. ISBN 9781259010651.
- Heizer, Jay H. Dirección de la producción y de operaciones : decisiones estratégicas [on line]. 11a ed. Madrid [etc.]: Pearson Educación, 2015 [Consultation: 19/10/2020]. Available on: http://www.ingebook.com/ib/NPcd/IB_BooksVis?cod_primaria=1000187&codigo_libro=5779. ISBN 9788490352878.

Complementary:

- Domínguez Machuca, J. A. Dirección de operaciones : aspectos estratégicos en la producción y los servicios. Madrid: McGraw-Hill/Interamericana de España, cop. 1995. ISBN 8448118480.
- Domínguez Machuca, J. A. Dirección de operaciones : aspectos tácticos y operativos en la producción y los servicios. Madrid: McGraw-Hill, cop. 1995. ISBN 8448118030.
- Krajewski, Lee J; Ritzman, Larry P; Malhotra, Manoj K. Operations management : processes and supply chains. 10th ed., global ed. Harlow: Pearson Education, cop. 2013. ISBN 9780273766834.
- Waller, Derek L. Operations management : a supply chain approach. 2a ed. London: Thomson, cop. 2003. ISBN 9781861528032.

RESOURCES

Other resources:

Slides and cases description (campus).