

Course guide

320017 - OP - Production Organisation

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Unit in charge: Terrassa School of Industrial, Aerospace and Audiovisual Engineering
Teaching unit: 732 - OE - Department of Management.

Degree: BACHELOR'S DEGREE IN CHEMICAL ENGINEERING (Syllabus 2009). (Compulsory subject).
BACHELOR'S DEGREE IN ELECTRICAL ENGINEERING (Syllabus 2009). (Compulsory subject).
BACHELOR'S DEGREE IN INDUSTRIAL ELECTRONICS AND AUTOMATIC CONTROL ENGINEERING (Syllabus 2009). (Compulsory subject).
BACHELOR'S DEGREE IN MECHANICAL ENGINEERING (Syllabus 2009). (Compulsory subject).
BACHELOR'S DEGREE IN TEXTILE TECHNOLOGY AND DESIGN ENGINEERING (Syllabus 2009). (Compulsory subject).

Academic year: 2024 **ECTS Credits:** 6.0 **Languages:** Catalan, Spanish

LECTURER

Coordinating lecturer: Martí Badía, M^a Elena

Others: Martí Badía, M^a Elena
Arcusa Postils, Ignasi
Torres Soto, Josep Lluís

PRIOR SKILLS

It is recommended to have passed the subject Economics and Business Management.

DEGREE COMPETENCES TO WHICH THE SUBJECT CONTRIBUTES

Specific:

CE15-INDUS. Basic knowledge of production and manufacturing systems. (Common module in the industrial branch)

CE17-INDUS. Applied knowledge of business organization. (Common module in the industrial branch)

Generical:

CG03-INDUS. Knowledge in basic and technological subjects that enable them to learn new methods and theories and provide them with versatility to adapt to new situations.

CG04-INDUS. 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.

CG05-INDUS. Knowledge for carrying out measurements, calculations, valuations, appraisals, expert opinions, studies, reports, work plans, and other similar tasks.

CG08-INDUS. Ability to apply the principles and methods of quality.

Transversal:

CT01 N2. Entrepreneurship and innovation - Level 2. Taking initiatives that give rise to opportunities and to new products and solutions, doing so with a vision of process implementation and market understanding, and involving others in projects that have to be carried out.

CT01 N3. Entrepreneurship and innovation - Level 3. Using knowledge and strategic skills to set up and manage projects. Applying systemic solutions to complex problems. Devising and managing innovation in organizations.

TEACHING METHODOLOGY

In the classes for theory, problem-based learning will be used, where the concepts of the subject will be introduced.

In parallel, in the classes dedicated to practicals, a real project will be developed in which the knowledge acquired in the subject will be applied. The project will be worked on in a computer room, in groups of 2 people. The subject of the project will be proposed by the students and agreed with the internship teacher, who will act as a guide in the execution of the project. Students will submit a report of the complete work and will present it orally at the end of the course.

LEARNING OBJECTIVES OF THE SUBJECT

The subject is divided into two parts. The aim of the first part is to give students and introduction to strategic aspects of the management of operations.

The aim of the second part is to give students an introduction to the tactical aspects of the management of operations.

The syllabus covers the principles and concepts used in the management of operations, which may also apply in other professional areas or the personal lives of students.

All topics begin with an introduction to other areas of business and a brief history of the management of operations and the introduction of innovation as a strategy to be followed.

Within the framework of this strategy, the topic of product and process design, location and layout, as well as the design of work systems will be covered.

In the second part, the topics of the management and control of stock and aspects of planning will be explained in terms of how to effectively manage resources and match demand based on the production process used.

Lastly, in the field of quality assurance, the concepts of quality management, quality costs, new trends in the study of the concept, certifications and common quality assurance tools will be developed. Students will then go on to tackle the concepts of quality control, inspections, sampling and control diagrams of the capacity of processes.

STUDY LOAD

| Type | Hours | Percentage |
|--------------------|-------|------------|
| Hours medium group | 15,0 | 10.00 |
| Self study | 90,0 | 60.00 |
| Hours large group | 45,0 | 30.00 |

Total learning time: 150 h

CONTENTS

TOPIC 1: INTRODUCTION TO OPERATIONS MANAGEMENT

Description:

- 1.1. The function of operations as a business subsystem
- 1.2. Problems of the function of operations
- 1.3. Innovation as a strategic process
- 1.4. Innovative organisation
- 1.5. The management of innovation in businesses
- 1.6. Technological innovation: the key to the future?

Specific objectives:

Upon completion of this subject, students will be able to:

- Put a production subsystem in place in a business.
- Tackle the complex problem of the function of operations today, its importance and basic characteristics.
- Understand the concept of innovation as a catalyst for change.

Related activities:

Test

Full-or-part-time: 10h

Theory classes: 3h

Practical classes: 1h

Self study : 6h

TOPIC 2: PRODUCT SELECTION AND DESIGN

Description:

- 2.1. The selection of products and services
- 2.2. The design stage and product development
- 2.3. Production documents
- 2.4. Models for the development of new products

Specific objectives:

Upon completion of this subject, students will be able to:

- Identify the main objectives in the design of products and services.
- Discuss the importance of standardisation, regulations, ethics and the environment in the design of products and services.
- Describe the design and development stages of a product and of a service.
- List a number of sources on which ideas for designs were based.
- Describe various key factors in manufacturing and service design.
- Identify challenges in the design of products and services.

Related activities:

1. Test
2. Applied exercises

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

Theory classes: 4h

Practical classes: 1h

Self study : 7h 30m

TOPIC 3: PROCESS SELECTION AND DESIGN

Description:

- 3.1. Different types of processes
- 3.2. Process strategies
- 3.3. The selection of processes
- 3.4. Constraints in process design

Specific objectives:

Upon completion of this subject, students will be able to:

- Give reasons for the strategic importance of selecting a process.
- Understand the influence that the selection of a process has on organisation.
- Be able to explain the various types of processes.
- Discuss and tackle possible ways of automating processes.
- Recognise the need to manage technology.

Related activities:

- 1. Test
- 2. Applied exercises

Full-or-part-time: 10h

Theory classes: 3h

Practical classes: 1h

Self study : 6h

TOPIC 4: LOCATION DECISIONS

Description:

- 4.1. Location decision-making procedures
- 4.2. Factors that affect location
- 4.3. Assessment methods in the location of facilities
- 4.4. Location of services facilities
- 4.5. Future trends and strategies in location

Specific objectives:

Upon completion of this subject, students will be able to:

- Describe some of the main reasons on which organisations base their location decisions.
- Explain why location decisions are important.
- Assess the location options available for taking decisions.
- Discuss the decisive factors in decision-making.
- Sum up the decision-making process in the choice of locations.
- Use the techniques in the field for solving standard problems.

Related activities:

- 1. Test
- 2. Applied exercises
- 3. Structure and analysis test

Full-or-part-time: 10h

Theory classes: 3h

Practical classes: 1h

Self study : 6h

TOPIC 5: LAYOUT

Description:

- 5.1. Goals and factors that influence the selection of a layout
- 5.2. Types of layout
- 5.3. Distribution by products
- 5.4. Distribution by processes
- 5.5. Distribution by workcells
- 5.6. Other distributions

Specific objectives:

Upon completion of this subject, students will be able to:

- Discuss reasons for redesigning the layout of processes.
- Describe the different types of layouts by processes.
- Describe the main advantages and disadvantages of layouts by product and by process.
- Solve simple line balancing problems.
- Develop simple layout processes.

Related activities:

1. Test
2. Applied exercises
3. Structure and analysis test

Full-or-part-time: 10h

Theory classes: 3h

Practical classes: 1h

Self study : 6h

TOPIC 6: DESIGN, MEASUREMENT AND COMPENSATION

Description:

- 6.1. Considerations in job design
- 6.2. Method study phases
- 6.3. Work measurement
- 6.4. Compensation methods

Specific objectives:

Upon completion of this subject, students will be able to:

- Explain the importance of job design.
- Expound on the advantages and disadvantages of specialisation.
- Discuss the aim of analysis methods and describe how they are applied in method studies.
- Describe four common techniques in the study of movements.
- Discuss the impact of working conditions on job design.
- Define standard time
- Describe and compare time study methods and perform calculations.
- Discuss payroll systems.

Related activities:

1. Test
2. Applied exercises
3. Structure and analysis test

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

Theory classes: 3h

Practical classes: 2h

Self study : 7h 30m

TOPIC 7: INTRODUCTION TO PLANNING. CAPACITY CONTROL

Description:

- 7.1. Introductory notions
- 7.2. Basic planning concepts
- 7.3. The design of a planning system
- 7.4. The determination of available capacity
- 7.5. The determination of capacity needs
- 7.6. Alternatives for adjusting available and necessary capacity in the short- and mid-term.

Specific objectives:

Upon completion of this subject, students will be able to:

- Explain the importance of planning capacity.
- Discuss the ways in which capacity can be defined and measured.
- Describe the components of effective capacity.
- Discuss the main considerations related to the alternatives to the development of capacity.
- Sum up the approaches that are useful in the assessment of alternative capacities.

Related activities:

1. Test
2. Applied exercises
3. Structure and analysis test

Full-or-part-time: 10h

Theory classes: 3h

Practical classes: 1h

Self study : 6h

TOPIC 8: PRODUCTION PLANNING AND SCHEDULING

Description:

- 8.1. Drawing up an aggregate plan: possible actions and factors to be considered
- 8.2. Aggregate planning techniques
- 8.3. The master production schedule
- 8.4. Rough-cut capacity planning

Specific objectives:

Upon completion of this subject, students will be able to:

- Explain what aggregate planning is and its use.
- Identify the decision variables that manufactures must take into account in aggregate planning and some of the possible strategies to use.
- Describe some of the quantitative planning techniques used.
- Draw up aggregate plans and estimate their cost.

Related activities:

1. Test
2. Applied exercises
3. Structure and analysis test

Full-or-part-time: 10h

Theory classes: 3h

Practical classes: 1h

Self study : 6h

TOPIC 9: STOCK MANAGEMENT

Description:

- 9.1. The concept and functions of stock
- 9.2. Factors involved in stock management
- 9.3. Item classification systems
- 9.4. Stock management models

Specific objectives:

Upon completion of this subject, students will be able to:

- Define the term inventory and list the requirements for efficient stock management.
- Discuss the nature of stocktaking, and periodic and perpetual inventory systems.
- Describe the ABC systems and their use.
- Describe the economic lot size model for purchases and solve standard problems.
- Describe the economic lot production model and solve standard problems.
- Describe the quantity discount model and solve standard problems.
- Describe order point models and solve standard problems.
- Describe situations in which the single period model is most suitable and solve standard problems.

Related activities:

1. Test
2. Applied exercises
3. Structure and analysis test

Full-or-part-time: 10h

Theory classes: 3h

Practical classes: 1h

Self study : 6h

TOPIC 10: INTRODUCTION TO PLANNING. CAPACITY CONTROL

Description:

- 10.1. Meaning and application
- 10.2. The master production schedule (MPS)
- 10.3. The system and structure of material requirements planning (MRP)
- 10.4. Improvements in MRP
- 10.5. Lot quantification
- 10.6. Relationship between just-in-time (JIT) and MRP

Specific objectives:

Upon completion of this subject, students will be able to:

- Describe under which conditions the use of MRP is most suited.
- Describe the input, output and characteristics required to implement MRP.
- Explain how MPS requirements translate into material purchase requirements.
- Discuss the benefits and requirements of MRP.
- Explain in which ways the MRP system is useful in planning capacity requirements.
- Describe the potential benefits and difficulties users encounter in setting up an MRP system.
- Describe manufacturing resource planning (MRP II) and its benefits.

Related activities:

1. Test
2. Applied exercises
3. Structure and analysis test
4. Review and assessment of coursework

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

Theory classes: 4h

Practical classes: 1h

Self study : 7h 30m

TOPIC 11: JUST-IN-TIME (JIT) PRODUCTION

Description:

- 11.1. Philosophy of the just-in-time concept
- 11.2. The Toyota production system
- 11.3. Requirements for applying JIT
- 11.4. JIT in services

Specific objectives:

Upon completion of this subject, students will be able to:

- Explain the importance of JIT and its aims.
- List and describe the basic elements of JIT.
- Discuss the benefits of JIT.
- Describe the considerations to be taken into account for turning a traditional production system into a JIT-based system.
- Explain the obstacles that may be encountered in implementing a JIT system.

Related activities:

1. Test
2. Applied exercises
3. Structure and analysis test
4. Review and assessment of coursework

Full-or-part-time: 10h

Theory classes: 3h

Practical classes: 1h

Self study : 6h

TOPIC 12: OPTIMISED PRODUCTION TECHNOLOGY (OPT) AND THE THEORY OF CONSTRAINTS (TOC)

Description:

- 12.1. Business targets based on a TOC approach
- 12.2. The theory of constraints
- 12.3. TOC applied to the management of an operations subsystem: OPT
- 12.4. Rules for applying OPT
- 12.5. Comparison between OPT, MRP and JIT systems

Specific objectives:

Upon completion of this subject, students will be able to:

- Discuss business targets.
- Explain why results should be measured.
- Give reasons for capacity imbalances.
- Control methods in synchronous manufacturing.
- Contrast synchronous manufacturing, MRP and JIT systems.
- Identify relationships with other departments in a company.

Related activities:

1. Test
2. Applied exercises
3. Structure and analysis test
4. Review and assessment of coursework

Full-or-part-time: 10h

Theory classes: 3h

Practical classes: 1h

Self study : 6h

TOPIC 13: PROJECT PLANNING, PROGRAMMING AND MONITORING

Description:

- 13.1. Basic principles of the project evaluation and review technique (PERT)
- 13.2. Constructing a PERT chart
- 13.3. Project management using PERT
- 13.4. Monitoring projects using PERT charts
- 13.5. The ROY project control method

Specific objectives:

Upon completion of this subject, students will be able to:

- Discuss the nature and importance of the work breakdown structure in project management.
- Give a general description of the PERT and the critical path method (CPM).
- Draw simple project network diagrams.
- Describe the type of information a PERT or CPM analysis can give.
- Analyse networks using deterministic times.
- Analyse networks using probabilistic times.
- Explain the costs of reducing activities and solve standard problems.

Related activities:

1. Test
2. Applied exercises
3. Structure and analysis test
4. Review and assessment of coursework

Full-or-part-time: 10h

Theory classes: 3h

Practical classes: 1h

Self study : 6h

TOPIC 14: QUALITY MANAGEMENT. QUALITY CONTROL

Description:

- 14.1. Definition of quality
- 14.2. Total quality management (TQM)
- 14.3. Quality control
- 14.4. Quality control tools
- 14.5. Quality standards

Specific objectives:

Upon completion of this subject, students will be able to:

- Define the term quality and explain its importance.
- Identify the components of quality and its associated costs.
- Discuss the premises of quality and the philosophies of quality experts.
- Describe TQM.
- Give an overview of problem solving and process improvement.
- Describe how various quality tools work.
- Explain the elements that make up process control.
- Discuss and interpret how control diagrams are used to control processes.
- Use and interpret control diagrams.
- Use sequential tests of randomness to control processes.
- Assess the capacity of processes.

Related activities:

1. Test
2. Applied exercises
3. Structure and analysis test
4. Review and assessment of coursework

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

Theory classes: 4h

Practical classes: 1h

Self study : 7h 30m

GRADING SYSTEM

For those students who meet the requirements and submit to the reevaluation examination, the grade of the reevaluation exam will replace the grades of all the on-site written evaluation acts (tests, midterm and final exams) and the grades obtained during the course for lab practices, works, projects and presentations will be kept.

If the final grade after reevaluation is lower than 5.0, it will replace the initial one only if it is higher. If the final grade after reevaluation is greater or equal to 5.0, the final grade of the subject will be pass 5.0.

BIBLIOGRAPHY

Basic:

- Ponti, F.; Ferràs, X. Passió per innovar: de la idea al resultat. Barcelona: Granica, 2006. ISBN 9788475779188.
- Chase, Richard B.; Jacobs, F. Robert. Administración de operaciones: producción y cadena de suministros [on line]. 15a ed. México: McGraw-Hill, 2019 [Consultation: 08/03/2023]. Available on: https://www-ingebook-com.recursos.biblioteca.upc.edu/ib/NPcd/IB_BooksVis?cod_primaria=1000187&codigo_libro=8267. ISBN 9781456261412.
- Stevenson, William J. Operations management. 10th ed. New York: McGraw-Hill Irwin, 2009. ISBN 9780070091771.
- Cuatrecasas Arbós, Ll. Organización de la producción y dirección de operaciones: sistemas actuales de gestión eficiente y competitiva. Madrid: Díaz de Santos, 2011. ISBN 9788479789978.

Complementary:

- Domínguez Machuca, J. A. [et al.]. Dirección de operaciones: aspectos tácticos y operativos en la producción y los servicios. Madrid:



McGraw-Hill, 1995. ISBN 8448118030.

- Heizer, J. H.; Render, B.; Martínez, J. L. Dirección de la producción y de operaciones: decisiones estratégicas [on line]. 11a ed. Madrid: Pearson Educación, 2015 [Consultation: 08/03/2023]. Available on: https://www-ingebook-com.recursos.biblioteca.upc.edu/ib/NPcd/IB_BooksVis?cod_primaria=1000187&codigo_libro=5779. ISBN 9788490352878.

- Gaither, N.; Fraizer, G. Administración de producción y operaciones. 4a ed. México: International Thomson, 2000. ISBN 9706860312.