# Curricular Unit Form (FUC)

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| Course: | **FIRST CYCLE IN MECHANICAL ENGINEERING** | | | | | |
| Curricular Unit (UC) | **Operation Management** | | | Mandatory | **X** | |
| | | | | Optional | | |
| Scientific Area: | **Mechanical Design, Manufacturing and Industrial Maintenance** | | | | | |
| Year: **3º** | Semester: **2º** | ECTS:**4,0** | | Total Hours: **3,0** | | |
| Contact Hours: | T: | TP:**45** | PL: | S: | OT: | TT: |
| Professor in charge | | Academic Degree | | Position | | |
| **António João P. C. Feliciano Abreu** | | **Doutor** | | **Professor Adjunto** | | |

T- Theoretical ; TP – Theory and practice ; PL – Laboratory ; S – Seminar ; OT –Tutorial ; TT – Total of contact hours

| Entry into Force | Semester: **Winter** | Academic Year: **2010/2011** |
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**Objectives of the curricular unit and competences** (max. 1000 characters)

**Objectives**

- Training of managers for industrial environment, mainly in Operations Management.
- Understand the relevance of production and operations management in organizations;
- Identify and characterize several production environments;
- Characterize performance indicators used in production systems;
- Model production systems using a simulator with graphical interface;

**Competencies**

- Adaptation to new situations, themes and responsibilities;
- Ability to learn, analyze and synthesize;
- Ability to perform teamwork or individual work;
- Communication of scientific information, ideas, problems and solutions, in diversified frameworks;
- Production Technologies and Engineering;
- Operations Management;
- Quantitative Methods and Statistical Techniques;
- Autonomous acquisition and interpretation of data from several sources.

**Syllabus** (max. 1000 characters)

## Production Strategies

- Production management: Definition and scope;
- Production management influence in surrounding services;
- The role of production management in the strategic definition.

## 2. Aggregate planning and master production schedule

- Production plans in companies a hierarchical approach;
- Strategies and variables used in production planning;
- Typology and costs structure in the strategic planning.

## 3. Inventory Management

- ABC Analysis;
- Independent Demand Inventory Models: The Basic Economic Order Quantity Model and Fixed Period Inventory Models;
- Minimizing Costs. Holding, Ordering and Setup costs. Determining Economic Order Quantity and Production Lot Quantity;
- Determining Safety Stock level.

## 4. Material Requirements and Manufacturing Resource Planning

- Scope and benefits;
- Bill of Materials usage;
- Basic MRP logics;
- Capacity Requirements Planning (CRP) – MRP II, ERP.

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## 5. Scheduling

- Heuristics Rules and Assignment methods;
- Work Plan Assessment;
- Scheduling with limited capacity: Johnson's method for n/2 e n/3.

## 6. Modelling Productions Operations

- Simulation role;
- Steps of a simulation study;
- Simulation of production processes ;
- Basic concepts of queue models (M/M/1, M/G/1 e M/M/S);
- Elements of a Simulation Model;
- Basic System modelling using Arena Software.

## 7. New Production trends:

- JIT systems

- Kanbans systems characterization;
- JIT scheduling
- Lean Management.
- Lean systems characterization and tools.

**Demonstration of the syllabus coherence with curricular unit's objectives** (max. 1000 characters)

Objective: Training of managers for industrial environment, mainly in Operations Management.
Chapters – All chapters.
Objective: Understand the relevance of production and operations management in organizations;
Chapters: Production Strategies, and Aggregate planning and master production schedule
Objective: Identify and characterize several production environments;
Chapters: Inventory Management, and Material Requirements and Manufacturing Resource Planning, New Production trends.
Objective: Characterize performance indicators used in production systems;
Chapters: Scheduling
Objective: Model production systems using a simulator with graphical interface;
Chapters: Modelling Productions Operations

**Teaching methodologies (including evaluation)** (max. 1000 characters)

**Teaching Methodology**

Lectures are carried out combining theoretical classes and applied classes.

In theoretical classes, the lecture initiates with a short reference of the main subjects treated in the previous lecture and the summary of the subjects that will be discussed in that day. After that, concepts and models are explained, discussed and applied, stimulating the student participation. In the end of the lecture, the most relevant aspects presented and discussed are highlighted as well as the subjects for the following lecture, encouraging students to study the subjects before there discussion.

In practical classes, exercises and case studies are analyzed and discussed. To develop and improve other competences and capacities, the students must also carry out, computer analyzes and work reports which must also be presented and discussed in class.

**Demonstration of the teaching methodologies coherence with the curricular unit's objectives** (max. 3000 characters)

Objective: Training of managers for industrial environment, mainly in Operations Management.
Methodology: Case-study, Solving practical cases and calculations.
Objective: Understand the relevance of production and operations management in organizations;
Methodology: Case-study, Solving practical cases and calculations.
Objective: Identify and characterize several production environments;
Methodology: Solving practical cases and calculations.
Objective: Characterize performance indicators used in production systems;
Methodology: Solving practical cases and calculations.
Objective: Model production systems using a simulator with graphical interface;
Methodology – case-study.

**Main Bibliography** (max. 1000 characters)


- Victor Roldão e Joaquim Ribeiro. *Organização da produção e das operações : da concepção do produto à organização do trabalho*. Monitor, **2004.**
- Ulrich, Karl T. & Eppinger. Steven D. Product design and development. 3rd ed. McGraw-Hill, **2003**.
- Heizer, J. & Render, B. Operations Management. New Jersey, Pearson Prentice Hall, **2006**
- Stevenson, W. Operations Management (9th ed.).Boston, Irwin / McGraw-Hill, **2006**
- Chase, B. Richard; Nicholas J. Aquilano e F. Robert Jacobs. *Production and operations management: manufacturing and services (e-doc).* 8ª Edição. Irwin/McGraw-Hill, **1998**.
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- A. Courtois, M. Pillet e C. Martin. *Gestão da Produção*. 4ª Edição. Lidel, **1996**.
- Monks, G. Joseph. *Administração da Produção*. McGraw-Hill, S. Paulo, **1985**.
- Kelton, Sadowski, Sturrock. *Simulation with arena. 4º Edição.* McGraw-Hill, **2007**.