



ESCUELA TÉCNICA SUPERIOR DE INGENIERÍA
DEPARTAMENTO DE ORGANIZACIÓN INDUSTRIAL

Subject: Deterministic Optimization 2016-17

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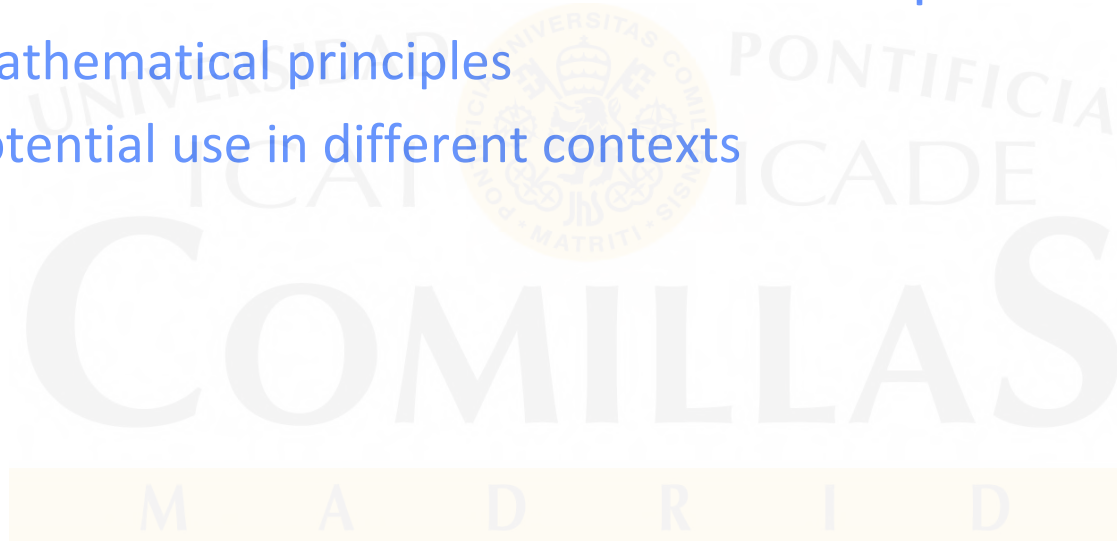
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Objectives

- ❑ Understand how to model deterministic optimization problems
- ❑ Understand the mathematical techniques
 - ✓ Mathematical principles
 - ✓ Potential use in different contexts



Competences to be developed

- Understand where to use and concepts of deterministic optimization
- Know how to build a model efficiently
- Achieve mathematical rigorousness
- Understand the mathematical techniques
- State and solve mockup problems
- Analyze the solutions
- To become familiar with an algebraic language used professionally

Grading system

- ❑ Grades will be a weighted average of:
 - ✓ Class participation (5 %)
 - ✓ Class presentations (15 %)
 - ✓ Technical paper (80 %)

- ❑ **Class participation** accounts for class attendance and active participation
- ❑ Every day there will be two presentations of the current state of development of the projects
- ❑ **Grade of the technical paper must be ≥ 3.5 (over 10)** to consider the other concepts. Otherwise, this grade will be the final one

Contents

1. Linear Optimization

1. Graphical simplex method
2. Algebraic simplex
3. Tabular form
4. Revised simplex. Product form of the inverse
5. Reduced costs. Dual variables
6. Primal-dual interior point method

2. Modeling of Mixed Integer Linear Programming Problems

1. Piecewise linear. Convex and concave regions. Special ordered sets. Reformulation.

3. Mixed Integer Linear Optimization

1. Branch and bound. Duality.
2. Preprocessing. Branch and cut.

4. Nonlinear Optimization

1. Unconstrained problem optimality conditions.
2. Unconstrained problem solution methods.
3. Constrained problem optimality conditions.
4. Constrained problem solution methods. Conjugate gradient.