

Course guide

240IOI11 - 240IOI11 - Quantitative Methods of Industrial Process Management I

Last modified: 01/06/2023

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

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

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

LECTURER

Coordinating lecturer: Amaia Lusa

Others: Amaia Lusa

PRIOR SKILLS

Capacitat per modelitzar problemes de disseny i gestió de sistemes productius i logístics mitjançant la programació matemàtica, fent ús de tècniques bàsiques de modelització.

DEGREE COMPETENCES TO WHICH THE SUBJECT CONTRIBUTES

Specific:

CEEORG2. Design, develop and apply analytical methods (quantitative methods, statistics, models and decision tools) in order to make strategic, tactical and operational decisions for organizations.

TEACHING METHODOLOGY

The subject is mainly of a practical nature. The sessions combine practical exercises with group work and short theoretical presentations. During the parts he dedicates a practical work in a group is to work in groups on the statement of a case or problem; the teaching staff gives general or specific guidance for a group and resolves the doubts that arise. They are not problem classes in which the teacher explains how to solve them; it is the student who, with the relevant guidelines, must discover the difficulties and the way to solve them. All sessions are done with a computer.

In addition to participation in scheduled sessions, there is coursework that forms part of continuous assessment.

Consultations with the teaching staff of the subject must be considered an essential element in the learning process.

LEARNING OBJECTIVES OF THE SUBJECT

At the end of the course the student must be able to develop advanced optimization models to solve problems of design or management of a system and to obtain and interpret the results corresponding to the models.

Specifically:

- 1) Formulate mathematical programs using advanced modeling techniques with integer variables.
- 2) Formulate mathematical programs with multiobjective functions and know how to design and analyze experiments to determine the appropriate weight of each criterion in the function as well as present the results to the person in charge of choosing a solution (determine the Pareto boundary).
- 3) To know techniques to consider uncertainty in data

STUDY LOAD

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

Total learning time: 112.5 h

CONTENTS

PROBLEM SOLVING USING ADVANCED TECHNIQUES OF MATHEMATICAL PROGRAMMING

Description:

Advanced modeling techniques with integer variables
Multi-objective optimization
Optimization considering uncertainty

Specific objectives:

- 1) Formulate mathematical programs using advanced modeling techniques with integer variables.
- 2) Formulate mathematical programs with multiobjective functions and know how to design and analyze experiments to determine the appropriate weight of each criterion in the function as well as present the results to the person in charge of choosing a solution (finding the Pareto frontier).
- 3) To know techniques to consider uncertainty in data

Related activities:

Participatory classes (theoretical presentations and activities in the classroom).
Study (autonomous learning)
Assessment activities (within autonomous learning).

Full-or-part-time: 112h 30m

Practical classes: 42h
Self study : 70h 30m

GRADING SYSTEM

The final grade will be the one obtained through the following formula:

$$NF = 0.1 \cdot \max(N_{\text{Class}}, NEF) + 0.2 \cdot \max(N_T, NEF) + 0.2 \cdot \max(N_{\text{Partial}}, NEF) + 0.5 \cdot NEF$$

NF: Final note

NClasse: Evaluation of the work developed during the sessions

NT: Grade work (the work, if done, must be done in a group and will not be assessed if all partial deliveries have not been made; you must attend the sessions dedicated to the work)

NPartial: Note of the partial exam that takes place in the middle of the year

NEF: Final exam note

In case of re-evaluation, the final mark will be the one obtained in the re-evaluation exam.

EXAMINATION RULES.

You can bring a form (one A4 sheet on both sides) to the exams.



BIBLIOGRAPHY

Basic:

- Corominas Subias, Albert ; Carles Batlle Arnau ; Ernest Benedito Benet ; Bruno Domenech Lega ; Enric Fossas Colet ; Aberto García Villoria ; Amaia Lusa García ; Rafael Pastor Moreno. Técnicas de optimización. Madrid: Editorial Dextra, 2021. ISBN 9788417946531.

RESOURCES

Computer material:

- Diapositives de l'assignatura. Diapositives de l'assignatura, que es penjaran al campus ATENEA
- Enunciats de les pràctiques. Enunciats de les pràctiques, que es penjaran al campus ATENEA
- Enunciat treball de curs. Enunciats del treball de curs, que es penjarà al campus ATENEA