

Course guide

240215 - 240AU055 - Models and Tools of Decision Science

Last modified: 13/03/2025

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).
MASTER'S DEGREE IN AUTOMOTIVE ENGINEERING (Syllabus 2019). (Compulsory subject).

Academic year: 2025 **ECTS Credits:** 6.0 **Languages:** Spanish

LECTURER

Coordinating lecturer: Joaquín BAUTISTA-VALHONDO

Others: Joaquín BAUTISTA-VALHONDO

PRIOR SKILLS

- Number capacity.
- Reflective, analytical and synthesis attitude.
- Proactivity and responsibility.

REQUIREMENTS

- Applied statistics: Theory of probability. Distribution laws. Combinatorial
- Infinitesimal calculation.
- Linear algebra.

DEGREE COMPETENCES TO WHICH THE SUBJECT CONTRIBUTES

Specific:

CEAU5. Direct and organize enterprises and production systems and services, applying knowledge and skills in industrial organization, business strategy, planning and logistics, commercial and labor law, financial and cost accounting.

Generical:

CGAU1. Ability to apply appropriate knowledge of mathematical aspects, analytical, scientific, instrumental, technological and management, the resolution of the problems of the automotive

CGAU7. Integrate knowledge and handle complexity, making judgments and decisions, from incomplete or limited information, including reflections on the social and ethical responsibilities of professional practice

CGAU9. Communicate and discuss proposals and conclusions in forums multilingual, skilled and unskilled, in a clear and unambiguous

Transversal:

CT3. TEAMWORK: Being able to work in an interdisciplinary team, whether as a member or as a leader, with the aim of contributing to projects pragmatically and responsibly and making commitments in view of the resources that are available.

TEACHING METHODOLOGY

Master class: the faculty exposes the theoretical and practical contents of the subject, with the active participation of the students.

Practical class: the student solves practices and problems proposed by the teaching staff and with the help of this one.

Business Case: The students, in groups of 4 to 6 people, will develop team projects throughout the course. The follow-up of the development of the projects by teams will be weekly with oral presentations and discussions in class. There will be final defenses of each project (BCD) in which all the members of each team must participate.

LEARNING OBJECTIVES OF THE SUBJECT

The student by the end of the course must be able to solve in a rational way situations of decision making in complex systems. He or she will have to identify and apply the different tools which have been explained. The student will have to value the analysis, formulate the corresponding abstraction and describe the synthesis of the complex situations, where multiple elements take part. The tools will have to be compared, evaluating the limitations which can be in each stage of the process of the decisions making and decide consequently

STUDY LOAD

Type	Hours	Percentage
Self study	96,0	64.00
Hours large group	36,0	24.00
Hours small group	18,0	12.00

Total learning time: 150 h

CONTENTS

title english

Description:

content english

Full-or-part-time: 2h

Theory classes: 2h

title english

Description:

content english

Full-or-part-time: 11h 36m

Theory classes: 2h

Self study : 9h 36m

title english

Description:

content english

Full-or-part-time: 17h 06m

Theory classes: 2h 30m

Practical classes: 2h 30m

Laboratory classes: 2h 30m

Self study : 9h 36m

title english

Description:

content english

Full-or-part-time: 17h 06m

Theory classes: 2h 30m

Practical classes: 2h 30m

Laboratory classes: 2h 30m

Self study : 9h 36m

title english

Description:

content english

Full-or-part-time: 17h 06m

Theory classes: 2h 30m

Practical classes: 2h 30m

Laboratory classes: 2h 30m

Self study : 9h 36m

title english

Description:

content english

Full-or-part-time: 15h 36m

Theory classes: 2h

Practical classes: 2h

Laboratory classes: 2h

Self study : 9h 36m

title english

Description:

content english

Full-or-part-time: 16h 06m

Theory classes: 2h 10m

Practical classes: 2h 10m

Laboratory classes: 2h 10m

Self study : 9h 36m

title english

Description:

content english

Full-or-part-time: 17h 06m

Theory classes: 2h 30m

Practical classes: 2h 30m

Laboratory classes: 2h 30m

Self study : 9h 36m

title english

Description:

content english

Full-or-part-time: 15h 36m

Theory classes: 2h

Practical classes: 2h

Laboratory classes: 2h

Self study : 9h 36m

title english

Description:

content english

Full-or-part-time: 17h 06m

Theory classes: 2h 30m

Practical classes: 2h 30m

Laboratory classes: 2h 30m

Self study : 9h 36m

title english

Description:

content english

Full-or-part-time: 6h 40m

Theory classes: 2h

Practical classes: 1h 30m

Laboratory classes: 1h 30m

Self study : 1h 40m

title english

Description:

content english

Full-or-part-time: 2h

Theory classes: 2h



GRADING SYSTEM

BIBLIOGRAPHY

Basic:

- Bautista-Valhondo, Joaquín. Modelos y herramientas de decisión [on line]. Madrid: DEXTRA Editorial, 2020 [Consultation: 30/10/2025]. Available on: <https://ebookcentral-proquest-com.recursos.biblioteca.upc.edu/lib/upcatalunya-ebooks/detail.action?pq-origsite=primo&docID=6777312>. ISBN 9788417946326.
- Bautista-Valhondo, Joaquín. Teoría de juegos en entornos competitivo y colaborativo : aplicaciones en política e industria [on line]. Madrid: Dextra Editorial, 2020 [Consultation: 02/07/2025]. Available on: <https://ebookcentral-proquest-com.recursos.biblioteca.upc.edu/lib/upcatalunya-ebooks/detail.action?pq-origsite=primo&docID=6776197>. ISBN 9788417946364.

Complementary:

- Hillier, Frederick S; Gerald J. Lieberman. Introducción a la investigación de operaciones. 11ª ed. Ciudad de Mexico: McGraw-Hill, 2023. ISBN 9781456291006.
- Hammond, John S. ; Keeney, Ralph L. ; Raiffa, Howard. Decisiones inteligentes : guía práctica para tomar mejores decisiones. 2a ed. Barcelona: Gestión 2000, cop. 2002. ISBN 8480887176.
- Bierman, Harold; Bonini, Charles P; Hausman, Warren H. Análisis cuantitativo para la toma de decisiones. 8a. ed. [Buenos Aires]: Addison-Wesley Iberoamericana, cop. 1994. ISBN 0201601273.
- Companys Pascual, Ramón. Programación dinámica. Barcelona: ETSEIB. CPDA, 2002. ISBN 8495355507.
- Companys Pascual, Ramón. Teoría de la decisión : utilidad, decisión, juegos y multicriterio. Barcelona: CPDA-ETSEIB, 2004. ISBN 8495355833.
- Bautista-Valhondo, Joaquín. Metaheurísticas en ingeniería [on line]. Madrid: DEXTRA Editorial, 2020 [Consultation: 30/10/2025]. Available on: https://www-ingebook-com.recursos.biblioteca.upc.edu/ib/NPcd/IB_BooksVis?cod_primaria=1000187&codigo_libro=10933. ISBN 9788417946432.

RESOURCES

Hyperlink:

- https://ocw.upc.edu/curs_publicat/240EO023/2017/1. Models i eines de decisió Course
- <http://www.prothius.com/docencia/?filtre=apuntes&filtre2=MD&lang=es>. Resource