

Course guide

205105 - 205105 - Tools for Decision Making

Last modified: 19/06/2026

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

Degree: MASTER'S DEGREE IN TECHNOLOGY AND ENGINEERING MANAGEMENT (Syllabus 2016). (Compulsory subject).

Academic year: 2026 **ECTS Credits:** 7.5 **Languages:** English

LECTURER

Coordinating lecturer: Fernandez Alarcon, Vicenç

Others: Fernandez Alarcon, Vicenç
Yin, Jiarui

DEGREE COMPETENCES TO WHICH THE SUBJECT CONTRIBUTES

Specific:

CE02-MEM. The ability to analyse data for pattern recognition.

CE03-MEM. The ability to optimise problems and systems using mathematical models and make decisions in conditions of uncertainty.

CE04-MEM. The ability to apply theoretical and fundamental principles of technology and engineering business management in conditions of uncertainty.

Transversal:

CT1a. ENTREPRENEURSHIP AND INNOVATION: Being aware of and understanding how companies are organised and the principles that govern their activity, and being able to understand employment regulations and the relationships between planning, industrial and commercial strategies, quality and profit.

CT2. SUSTAINABILITY AND SOCIAL COMMITMENT: Being aware of and understanding the complexity of the economic and social phenomena typical of a welfare society, and being able to relate social welfare to globalisation and sustainability and to use technique, technology, economics and sustainability in a balanced and compatible manner.

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.

CT4. EFFECTIVE USE OF INFORMATION RESOURCES: Managing the acquisition, structuring, analysis and display of data and information in the chosen area of specialisation and critically assessing the results obtained.

Basic:

CB6. Knowledge and understanding that provides a basis or opportunity for originality in the development and/or application of ideas, often in a research context.

CB7. METMF_The ability to apply the knowledge and problem-solving skills acquired in new or unfamiliar environments within wider (or multidisciplinary) contexts related to the area of study.

CB8. METMF_The ability to integrate knowledge and deal with the complexity of making judgements on the basis of information that, albeit incomplete or limited, includes thoughts on the role played by social and ethical responsibility in the application of knowledge and judgement.

CB9. METMF_The ability to communicate conclusions, and the knowledge and reasons that ultimately sustain these conclusions, to specialised and lay audiences in a clear and unambiguous way.

CB10-METP. Learning abilities that will enable students to keep studying in a largely self-directed or independent manner.



TEACHING METHODOLOGY

- * Lecture: Lecturers present concepts, principles, and techniques with the active participation of students.
 - * Problem-Based Learning: Lecturers and students resolve exercises and standard problems using specific techniques related to the course's theoretical content and principles.
 - * Project-Based Learning: Students resolve complex problems through specific techniques related to the theoretical contents and principles of the course.
- Self-study: Students diagnose their learning needs, collaborate with lecturers, and plan their own learning process.

LEARNING OBJECTIVES OF THE SUBJECT

The course introduces students to the principles, techniques, and tools of analysis and optimization in organizational decision-making.

STUDY LOAD

Type	Hours	Percentage
Hours medium group	30,0	16.00
Self study	127,5	68.00
Hours large group	30,0	16.00

Total learning time: 187.5 h

CONTENTS

Module 1: Explorative Data Analysis

Description:

The module introduces the principles and techniques for business data analysis through an explorative data analysis approach. The module covers the reading, manipulation, cleaning, analysis and reporting of business data.

Related activities:

Out- and in-class activities
Group project

Full-or-part-time: 129h

Theory classes: 22h
Practical classes: 22h
Self study : 85h

Module 2: Linear Programming

Description:

The module introduces the principles and techniques for optimizing organizational problems based on linear programming (also mixed and integer programming).

Related activities:

Out- and in-class activities
Final exam

Full-or-part-time: 58h 30m

Theory classes: 8h
Practical classes: 8h
Self study : 42h 30m

GRADING SYSTEM

The final grade depends on the following three elements:

- * 30%, Out- and in-class activities (any activity will have a weight greater than 5%)
- * 40%, Group project (report and dissertation)
- * 30%, Final exam

For those students who meet the requirements and submit to the reevaluation examination, the grade of the reevaluation exam will replace the final exam grade, and the grades obtained during the course for activities and projects 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 subject's final grade will be 5.0.

BIBLIOGRAPHY

Basic:

- Wickham, H.; Çetinkaya-Rundel, M.; Grolemund, G.. R for Data Science (2nd ed.) [on line]. O'Reilly, 2023 Available on: <https://r4ds.hadley.nz/>.
- Fernández, Vicenç. Fundamentals of research methodology. Terrassa: OmniaScience, 2020. ISBN 9788412064391.
- Sallán Leyes, J. M.; Lordan, O.; Fernández Alarcón, V. Modeling and solving linear programming with R [on line]. [S.l.]: OmniaScience, 2015 [Consultation: 12/04/2022]. Available on: <http://hdl.handle.net/2117/78335>. ISBN 9788494422935.

RESOURCES

Hyperlink:

- Github by Jose M Sallan. Content, Data Sets, and Scripts: <https://github.com/jmsallan>- Github by Vicenc Fernandez. Content, Data Sets, and Scripts: <https://github.com/vicencfernandez>