



COURSE DATA

DATA SUBJECT

Code: 44869
Name: Speciality: research
Cycle: Master's Degree
ECTS Credits: 10
Academic year: 2025-26

STUDY (S)

Degree	Center	Acad. year	Period
2237 - Master's Degree in Business Process Planning and Management	Facultat d'Economia	1	Second quarter

SUBJECT-MATTER

Degree	Subject-matter	Character
2237 - Master's Degree in Business Process Planning and Management	Speciality: research	ELECTIVES

COORDINATION

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SUMMARY

This module is an elective course of the Master in Business Process Planning and Management.

The elective courses of the master's degree give the student the possibility to choose his or her own orientation, directed towards business or towards an introduction to research. Specifically, this module covers the research orientation, aimed at both students who want to do their doctoral thesis and students who want to go deeper into the resolution of practical cases.

The two elective modules have a common part and a specific part. The common part brings together a set of activities to put students in contact with companies and professionals: visits to companies, presentations by professionals. It also includes a course on Innovation and Knowledge Management.

The specific part is an introduction to Python Programming and Optimisation in real cases. Applications to health services, to slicing and packing problems, and to the programming of discrete optimisation problems on large instances are taught.

Once the usefulness of the optimization methods has been learnt, and how they have been applied to real



cases, together with the programming tools, the student should be able to produce a memory that will help him/her to get started in the research field.

PREVIOUS KNOWLEDGE

RELATIONSHIP TO OTHER SUBJECTS OF THE SAME DEGREE

There are no specified enrollment restrictions with other subjects of the curriculum.

OTHER REQUIREMENTS

COMPETENCES / LEARNING OUTCOMES

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Be able to accept change as something connatural to economic activity and develop an attitude of alertness to the dynamism and uncertainty of the business environment.

Be able to integrate into teams, both as managers or coordinators and for specific and limited functions and in support of the team or of others.

Be able to integrate knowledge and handle the complexity of formulating judgments based on information that, while being incomplete or limited, includes reflection on social and ethical responsibilities linked to the application of knowledge and judgments.

Be able to model real situations as mathematical formulations, especially those involving decision making in complex scenarios.

Be able to synthesise and communicate the results, the conclusions of models and the solutions proposed in a rigorous and clear manner.

Be familiar with the optimisation and simulation tools available in the market and their possible adaptation to business problems. Consider the development of new applications.

Carry out and coordinate projects for technological improvement and innovation in management.

Develop the technical and analytical skills needed for decision making based on complex and incomplete information, which is the central element of the managerial activity.

Have a proactive attitude towards possible changes that may occur in their professional and/or investigative work.

Have the learning skills needed to continue studying in a way that will be largely self-directed or autonomous. Be able to approach new problems with new tools throughout their career.

Know how to communicate conclusions and the knowledge and rationale underpinning these, to specialist and non-specialist audiences, clearly and unambiguously.



Know how to work in multidisciplinary teams reproducing real contexts and contributing and coordinating their own knowledge with that of other branches and participants.

Lead, integrate and coordinate multidisciplinary work teams in charge of problem analysis and resolution.

Participate in, lead and coordinate debates and discussions, be able to summarize them and extract the most relevant conclusions accepted by the majority.

Show creativity when facing the resolution of complex problems and be able to evaluate the implications that the alternatives designed may have on the different agents involved.

Students should apply acquired knowledge to solve problems in unfamiliar contexts within their field of study, including multidisciplinary scenarios.

Students should be able to integrate knowledge and address the complexity of making informed judgments based on incomplete or limited information, including reflections on the social and ethical responsibilities associated with the application of their knowledge and judgments.

Students should communicate conclusions and underlying knowledge clearly and unambiguously to both specialized and non-specialized audiences.

Students should demonstrate self-directed learning skills for continued academic growth.

Students should possess and understand foundational knowledge that enables original thinking and research in the field.

To know how to apply acquired knowledge and solve problems in new or unfamiliar situations within wider contexts (or multidisciplinary) related with their field of study.

Use different presentation formats (oral, written, slide presentations, boards, etc.) to communicate knowledge, proposals and positions.

DESCRIPTION OF CONTENTS

0. Introduction. Basic research principles.

1. Introduction to the course.
2. Basic rules for the preparation of research papers.

1. Innovation Management

1. What is Innovation? Concepts. Types. The innovation process. Innovation strategies and implementation. Innovative culture. Organizational structures for innovation.



2. Innovation Ecosystems. Types of ecosystems. Existing models.
3. Innovation Strategies. Knowledge and Technology Transfer. Protection of innovation.
4. Open Innovation. Scenarios for Open Innovation. Open innovation and competitiveness.
5. Innovation as a source of competitive advantage. Value creation and innovation systematics in the company. Competitive positioning.

Practical Case Studies.

2. Python Programming

1. Introduction to programming
2. Construction and phases of a program
3. Language elements. Definition of variables and operators
4. Control flow and decision structures
5. Functions
6. Tuples and lists
7. Search and optimization algorithms

3. Real case studies

1. Optimization applied to health services.

The healthcare context. Optimization problems in health care. Modeling of deterministic problems and study of stochastic problems using scenarios. Real case of assignment of patients in waiting list to operating rooms.

2. Cutting and Packing Problems.

Introduction to cutting and packing problems in one, two and three dimensions. Models in two dimensions: the case of glass cutting at Saint-Gobain. Models in three dimensions: the case of transport in trucks of the Renault supplier network.

3. Discrete optimization algorithms coding lab.

Constructive methods and local-search methods. Solving large instances using commercial solvers and program coding.

WORKLOAD

PRESENCIAL ACTIVITIES



Activity	Hours
Seminar	20,00
Computer classroom practice	36,00
Total hours	56,00

NON PRESENCIAL ACTIVITIES

Activity	Hours
Attendance at other activities	0,00
Individual or group project	140,00
Independent study and work	0,00
Preparation of lessons	24,00
Preparation for assessment activities	30,00
Resolution of case studies	0,00
Total hours	194,00

TEACHING METHODOLOGY

The teaching methodology will consist of lectures in the classroom and work to be developed by students in teams. The lectures will be divided into:

- Theoretical lessons, in which the basic concepts of each of the points of the syllabus will be presented.
- Practical lessons, in which students will solve problems related to the contents of the course.

Also, students will have to carry out a project in which, for a specific problem, they will develop the phases of modeling, algorithm design, implementation, resolution, interpretation of the solution and writing of a scientific report.

EVALUATION

A) Innovation and knowledge management (3 points)

- 50% Continuous assessment: (20% attendance and active participation and 30% resolution and presentation of practical cases in class)
- 50% Final course test (in the last session).

B) Real case studies (7 points)

- 1.4 points: Python programming.
- 2.8 points: Real Case studies. Grades will be obtained by solving exercises proposed in class and participation in the sessions.
- 2.8 points: Carrying out a scientific investigation involving the resolution of an optimisation problem by modelling or implementing an algorithm. A scientific report will be submitted for



assessment. Presentation of the work may be required.

In order for the evaluation of the real cases to be taken into account for the final grade, the student must attend at least 50% of the classes and associated seminars. If this is not the case, the student will have to take a final exam corresponding to 100% of that part of the mark (both in first and second call).

To pass the course it is necessary to obtain a minimum of 1.2 points in part (A), a minimum of 3.5 in part (B) and that the sum of both parts is greater than or equal to five.

In the first call no activity will be recoverable with the exception of the final exam of the Innovation and Knowledge Management course.

In the case of not having passed the subject in the first call, the student may opt in the second call for exams of the parts that will constitute 100% of the grade.

REFERENCES

BASIC:

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INNOVATION:

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- Hoffecker, E., Understanding Innovation Ecosystems: A Framework for Joint Analysis and Action, Cambridge, MA: MIT D-Lab., 2019.
- López, N, Montes, J.M, Vázquez, C.J., Cómo gestionar la innovación en las pymes, Netbiblo,



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INNOVATION:

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- Mejorar la creación de spin-off y las licencias de patentes en las universidades españolas. Fundación CyD y RedTransfer (2020)
- Cómo usar la información de patentes para impulsar tus proyectos tecnológicos y científicos (www.pcu.v.es).
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