

**COURSE DATA****Data Subject**

Code	36432
Name	Innovation management in data science
Cycle	Grade
ECTS Credits	6.0
Academic year	2020 - 2021

Study (s)

Degree	Center	Acad. year	Period
1406 - Degree in Data Science	School of Engineering	3	Second term

Subject-matter

Degree	Subject-matter	Character
1406 - Degree in Data Science	10 - Economics, Business and Management	Obligatory

Coordination

Name	Department
PANACH NAVARRETE, JOSE IGNACIO	240 - Computer Science

SUMMARY

This is a subject from the third year of the second semester of the Data Science Degree. The aim of this subject is to give an insight on how to promote and manage innovation in projects, particularly those involving data analysis. In general, innovation can be defined as any change based on knowledge that produces value. Innovation management consists, for its part, in the organization and management of resources and processes in a systematic and organized manner in order to increase the creation of new knowledge and the generation of ideas that allow obtaining new products, services and processes, improve existing ones, transform these ideas into experimental prototypes, and transfer those same ideas and prototypes to the manufacturing, distribution and use phases to enable their commercialization and making them available to society.

The general objectives of this subject are:



- Introduce students to techniques to foster group creativity, formalize and manage ideas in the framework of innovation projects, and manage open innovation projects and initiatives
- Learn the main aspects and tools of project management: integration, scope, time, cost, quality, resources, risks and communication.
- Learn to manage the risks of a project and define preventive and corrective measures.
- Learn the main aspects and tools of agile project management methodologies for software development and data analysis from an agile perspective.
- Learn to define a business plan to exploit the results of the project.
- Introduce the student to the different business models around software development and data analysis.
- Introduce the student to the main mechanisms of protection, transfer and commercial exploitation of R I+D+i results from a legal point of view.
- Introduce the student to the concepts and practices of open data, open source, and open science.

Theory classes will be taught in Spanish and the practical and laboratory classes as stated in the subject file available on the degree website.

PREVIOUS KNOWLEDGE

Relationship to other subjects of the same degree

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

Other requirements

Without having prerequisites for enrollment, it is recommended to have taken the subjects of Legal Aspects on Second-Year Data, Business and Data Science, and subjects where you have worked with Python: Fundamentals of Programming, Data Structure and Algorithms, Data Visualization , Image Processing, and Parallel Programming

OUTCOMES

1406 - Degree in Data Science

- Students must be able to apply their knowledge to their work or vocation in a professional manner and have acquired the competences required for the preparation and defence of arguments and for problem solving in their field of study.



- Students must be able to communicate information, ideas, problems and solutions to both expert and lay audiences.
- (CG02) Ability to solve problems with initiative and creativity and to communicate and transmit knowledge, abilities and skills, which should include the ethical and professional responsibility of the activity of a data scientist.
- (CG03) Capability to elaborate models, calculations, reports, to plan tasks and other works analogous to the specific field of data science.
- (CG05) Analysis and synthesis capability in the preparation of reports and in the defence of ideas.
- (CT04) To be responsible for ones own professional development and specialisation, applying the acquired knowledge in the identification of career opportunities and sources of employment.
- (CT05) Ability to evaluate the advantages and disadvantages of different methodological and / or technological alternatives in different fields of application.
- (CE05) To understand the most relevant fields of application of data science and understand how data science is used to base and perform decision-making based on data

LEARNING OUTCOMES

This course aims to obtain the following learning outcomes:

1. Organize and direct resources, both human and financial, in order to increase the creation of new knowledge and its application in the field of Data Science. (T4), (G3)
2. Know techniques and procedures for generating practical ideas that allow obtaining new products, processes and services or improving existing ones in the field of Data Science. (G5), (CE5)
3. Design methods for the transfer of those same ideas to the phases of exploitation and use by the Company. (B4), (T5)
4. Be able to develop a Business Plan around a potential business idea (B2), (G2)

As a complement to the previous results, this subject also allows the acquisition of the following social skills and abilities:

- Apply techniques to encourage creativity in groups
- Be able to transform an idea into a project with a time estimate and cost.
- Track a project based on data analysis
- Know how to offer developed products to society



- Understand marketing techniques and product implantation
- Know how to approach the creation of emerging companies
- Know how to identify risks and how to minimize them
- Apply agile development techniques to the field of data science
- Be able to transfer the knowledge obtained with the project to society
- Know the legal aspects associated with the protection and exploitation of ideas

DESCRIPTION OF CONTENTS

1. INNOVATION AND COMPETITIVENESS

1. INNOVATION AND KNOWLEDGE
 - 1.1 THE CONCEPT OF INNOVATION
 - 1.2 WAYS TO INNOVATE
 - 1.3 RELATION BETWEEN INVESTIGATION, TECHNOLOGICAL DEVELOPMENT
 - 1.4 KNOWLEDGE AS THE BASIS OF INNOVATION
2. INNOVATION AND COMPETITIVENESS PATTERNS
 - 2.1 INNOVATION PROCESSES: MODELS
 - 2.2 INNOVATION AND COMPETITIVENESS: WHY INNOVATE
 - 2.3 INNOVATION AND ECONOMIC SECTORS
 - 2.4 INNOVATION INDICATORS

2. MANAGEMENT OF THE COMPANY'S INNOVATION PROCESSES

1. INNOVATION PROCESS IN THE BUSINESS MODEL
2. STIMULUS OF INNOVATIVE AND CREATIVE THINKING
3. LEADERSHIP OF THE CHANGE TOWARDS AN INNOVATION-ORGANIZED ORGANIZATION
4. STRATEGIC PLANNING OF THE INNOVATION PROCESS

3. INNOVATION METHODOLOGY

1. ANALYSIS OF TRENDS AND MARKET DEMANDS
2. BINOMY ANALYSIS IDEAS-INNOVATION
3. ANALYSIS OF VALUE CREATION ATTRIBUTES IN THE CLIENT
4. PROSPECTIVE ANALYSIS OF THE VALUES AND VALUE ATTRIBUTES DEMANDED BY THE MARKET
5. ANALYSIS AND DEVELOPMENT OF THE CORRECT STRATEGIC SEQUENCE IN THE CREATION OF NEW PRODUCTS / BUSINESSES



4. CREATIVITY TOOLS APPLIED TO COMPANIES

1. THE NEED FOR CREATIVITY IN THE COMPANY
2. THE ENTREPRENEUR AS CREATOR
3. CREATIVE LEADERSHIP: "THE LEADER MAKES THE COMPANY"
4. ATTITUDES, SKILLS, TECHNIQUES AND TOOLS
5. TACTICS FOR A CREATIVE COMPANY

5. DESIGN THINKING

1. INTRODUCTION AND DEFINITIONS
2. METHODOLOGY
3. PHASES
4. TECHNIQUES
5. DESIGN THINKING IN THE COMPANY
6. CASE STUDIES: CUSTOMER EXPERIENCE, PRODUCT, BUSINESS MODEL

6. LEAN STARTUP

1. THE PRINCIPLES OF THE LEAN STARTUP
 - 1.1 BUILD-MEASURE-LEARN
 - 1.2 THE ART OF PROTOTYPING
 - 1.3 THE MINIMUM VIABLE PRODUCT (PMV)
 - 1.4 THE RIGHT SEQUENCE IN LEAN STARTUP
2. CUSTOMER DEVELOPMENT IN PRACTICE
 - 2.1 DISCOVERY OF CLIENTS
 - 2.2 DETERMINATION OF THE HYPOTHESIS
 - 2.3 UNDERSTANDING THE PROBLEM
 - 2.4 THE VALIDATION OF OUR SOLUTION
 - 2.5 CUSTOMER VALIDATION
3. MANIFESTO CUSTOMER DEVELOPMENT

7. AGILE DEVELOPMENT

1. THE AGILE MANIFESTO
2. PRINCIPLES OF THE AGILE MANIFESTO
3. AGILE MANAGEMENT VS TRADITIONAL MANAGEMENT
4. SCRUM
 - 4.1 LIFE CYCLE
 - 4.2 ROLES
 - 4.3 ARTIFACTS
 - 4.4 ACTIVITIES
 - 4.5 TIME BOX
 - 4.6 DEVELOPMENT TEAM SPEED
 - 4.7 USER STORIES



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- 5. STEPS FOR A FIRST TEAM / SCRUM PROJECT
 - 6. TEST DRIVEN DEVELOPMENT
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8. RISK MANAGEMENT

- 1. CHARACTERIZATION OF RISKS
 - 2. RISK MANAGEMENT ACTIVITIES
 - 3. RISK ASSESSMENT TECHNIQUES
 - 4. RISK CONTROL TECHNIQUES
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9. BUSINESS MODELS BASED ON DATA ANALYSIS

- 1. ELEMENTS OF A BUSINESS MODEL
 - 2. BUSINESS MODELS BASED ON SOFTWARE DEVELOPMENT AND DATA ANALYSIS
 - 3. BASIC CONCEPTS OF SOFTWARE ECONOMICS
 - 4. SOFTWARE AND DATA ANALYSIS AS A MARKET AND BUSINESS OPPORTUNITY
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10. PROTECTION, TRANSFER AND OPERATION

- 1. TECHNICAL CREATIONS (PATENTS AND UTILITY MODELS)
 - 2. AESTHETIC CREATIONS (INDUSTRIAL DESIGNS)
 - 3. DISTINCTIVE SIGNS (BRANDS)
 - 4. TOPOGRAPHY OF SEMICONDUCTING PRODUCTS
 - 5. BUSINESS SECRET
 - 6. INTELLECTUAL PROPERTY MANAGEMENT
 - 7. TECHNOLOGICAL SURVEILLANCE
 - 8. TECHNOLOGICAL TRANSFER PROCESS
 - 9. ORGANIZATION OF TECHNOLOGICAL TRANSFER
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11. SCIENCE AND OPEN DATA

- 1. OPEN SCIENCE
 - 2. OPEN DATA
 - 3. OPEN SOURCE
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**WORKLOAD**

ACTIVITY	Hours	% To be attended
Theory classes	33,00	100
Laboratory practices	20,00	100
Classroom practices	7,00	100
Development of group work	3,00	0
Development of individual work	6,00	0
Study and independent work	12,00	0
Readings supplementary material	1,00	0
Preparation of evaluation activities	10,00	0
Preparing lectures	14,00	0
Preparation of practical classes and problem	35,00	0
Resolution of case studies	9,00	0
TOTAL	150,00	

TEACHING METHODOLOGY**Face-to-face classes.**

The face-to-face classes will be based on active expository classes where an activity that requires the intervention of the students will be introduced every 20/25 minutes, so that: 1) they can immediately put into practice the content they have just seen; 2) recover the level of attention to the next exhibition block. (G3), (T5)

Preparation of theoretical classes.

Students will have to prepare the content of the theoretical class, following the planning of the subject. To do this they will make use of the bibliography suggested by the teacher as well as the materials provided by the teacher from time to time or other orientations given.

Students will be offered activities that they must carry out in the classroom and at home, individually or in groups, and that will sometimes be necessary for the next theoretical session. These activities may be evaluated before the start of class or during class as well as in tutoring hours. (T4), (CE5)

Preparation of practical work.



To better assimilate the contents of the theoretical classes, face-to-face practical sessions will be held. Attendance at practical sessions is compulsory and will be verified by the teacher. Those students who are unable to attend for work reasons must contact their internship teacher before the internship. The results of these activities must be presented to the teacher in a staggered manner throughout the course and in the terms established by the teacher. Students will do / prepare part of these activities at home. Attendance at practices is compulsory. (G5), (G2).

Carrying out teamwork.

Throughout the course there will be a set of medium-sized problems that must be solved in teams of 3 to 6 people.

In the evaluation process of teamwork, both the joint grade of the group and the individual grade of each member will be graded. (B4), (B2)

The e-learning platform (Virtual Classroom) of the Universitat de València will be used as a support for communication with students. Through it you will have access to the didactic material used in class, as well as the problems and exercises to solve

EVALUATION

The evaluation of the subject will be carried out by:

(SE3) Continuous assessment (T4), (CE5), (G5), (G2) based on participation and degree of involvement in the teaching-learning process, taking into account regular attendance at planned face-to-face activities and the realization of works. As activities within the continuous evaluation, the students will carry out individually or in groups (as specified in each exercise) a set of bulletins of practical exercises or theoretical development that will be delivered through a virtual classroom within the period established for it. In addition, there will be two tests or short questions controls of a part of the subject. All these activities will lead to the continuous assessment grade as follows:

$$SE3 \text{ (Note Continuous Evaluation)} = 0.3 * \text{Controls} + 0.7 * \text{Bulletins}$$

Activities delivered after the deadline will not be taken into account. Copying in any of the activities will be strictly penalized, canceling all the continuous assessment notes of the student.

(SE1) Individual objective tests (G3), (T5), consisting of one or more exams, or knowledge tests, which will consist of both theoretical-practical questions and problems. It will be necessary to pass each of these tests or exams in order to pass the course.

(SE2) Evaluation of practices (B4, (B2). The practices are compulsory and will be done in groups. The practices will be evaluated based on the deliveries made through the virtual classroom and may be required to defend them through an exhibition or interview. The final mark of the practices will be the average of the different practices that make up the subject. In case there are practices of more than one session, they will be weighted so that they weigh based on the number of hours spent. to be able to do media



SE2 = average (practices)

In case of not having delivered at least one practice, the final mark of practices will be that of not presented. The average mark of the practices must be greater than 5 to pass the course.

In the case of having passed all the individual objective tests in section SE1 and obtained a grade equal to or greater than 5 in the practical section (SE2), the final grade for the course will be calculated as follows:

Final Note = $0.2 * SE3 + 0.5 * SE1 + 0.3 * SE2$

In case of not having passed any of the parts, the note in minutes will be computed as:

Final Note = minimum (SE1, SE2)

On second call, the grade for continuous evaluation (SE3) is not recoverable. The note of the parts (SE1 and SE2) will be kept in case they were approved on first call. Of the non-approved parts (SE1 and SE2) an examination will be carried out and it will be allowed to deliver again those practices not delivered or suspended.

In any case, the evaluation system will be governed by the provisions of the Evaluation and Qualification Regulations of the University of Valencia for Degrees and Masters:
(<https://webges.uv.es/uvTaeWeb/MuestraInformacionEdictoPublicoFrontAction.do?accion=inicio&idEdictoSeleccionado=5639>)

From 0 to 4.9: "Suspense"

From 5 to 6.9: "Approved"

From 7 to 8.9: "Remarkable"

From 9 to 10: "Outstanding" or "Outstanding with Honor Roll"

REFERENCES

Basic

- Apuntes y transparencias de la asignatura
- Sistemas de Gestión de la Innovación: Diseño e Implantación, D. Ruiz Quejido, J. Cavero Clerencia
- La Gestión de la Innovación y la Tecnología en las Organizaciones, A. Hidalgo Nuchera, G. León Serrano, J. Pavón Morote
- Innovación y Gestión de Nuevos Productos: Una Visión Estratégica y Práctica, A. Fernández del Hoyo



Additional

- Implantar SCRUM con éxito, J. L. Monte Galiano
- Test-Driven Python Development. Govindaraj, Siddharta
- Business model you: a one-page method for reinventing your career. Clark, Tim; Osterwalder, Alexander.; Pigneur, Yves.; Smith, Alan.; Papadakos, Trish.; Lacey, Megan.
- Think bigger : developing a successful big data strategy for your business. an Rijmenam, Mark, author. | New York : American Management Association, 2014
- The Data Industry: The Business and Economics of Information and Big Data. Tang, Chunlei | Hoboken: John Wiley & Sons, Incorporated | 2016 | 1st ed.

ADDENDUM COVID-19

This addendum will only be activated if the health situation requires so and with the prior agreement of the Governing Council

The teaching methodology of the course will follow the Teaching Model approved by the Data Science Academic Committee (<https://go.uv.es/cienciadatos/ModelDocentGCD2Q>). In the event that the facilities are closed for health reasons that affect all or part of the course sessions, these will be replaced by non-presential sessions following the established timetable. If the closure affects a presential assessment test for the subject, it will be replaced by a test of a similar nature that will be carried out in virtual mode through the computer tools supported by the University of Valencia. The percentages of each assessment test will remain unchanged, as established by this guide.