

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

<b>Code</b>	36503
<b>Name</b>	Visual Analytics and Communication
<b>Cycle</b>	Grade
<b>ECTS Credits</b>	6.0
<b>Academic year</b>	2019 - 2020

**Study (s)**

<b>Degree</b>	<b>Center</b>	<b>Acad. Period</b>
1332 - Degree in Business Intelligence and Analytics	Faculty of Economics	1 First term

**Subject-matter**

<b>Degree</b>	<b>Subject-matter</b>	<b>Character</b>
1332 - Degree in Business Intelligence and Analytics	5 - Fundamentos del Análisis de Datos	Basic Training

**Coordination**

<b>Name</b>	<b>Department</b>
CUÑAT GIMENEZ, RUBEN JOSE	110 - Applied Economics
PAVIA MIRALLES, JOSE MANUEL	110 - Applied Economics

**SUMMARY**

Visual Analytics and Communication is a basic training subject assigned to the area of Quantitative Methods for Economics and Business that is taught in the second term of the first year of the BUSINESS INTELLIGENCE AND ANALYTICS degree, with a total teaching load of 6 ECTS credits.

In a degree that aims to develop professionals with significant business knowledge that are able to explore and exploit, with business vision, the increasing data flows (both internal and external) that the new digital age is providing, a subject such as Visual Analytics and Communication becomes fundamental and essential. With billions of data being produced daily and with our ability to collect and store them increasing faster than our ability to analyse them, the new graduates need development proper skills that guide them in the process of analysis and in the process of properly communicate the findings for correct decision making.



The ability to combine the creative potential of the human being and its flexibility of thought in a process guided by knowledge, with the capacity of storage and computer processing that we have, offers us new opportunities and solutions to the most complex problems, for better informed decisions. Having instruments with which to support the production, presentation and dissemination of the results of an analysis to proper communicate the conclusions reached in the appropriate context and to a variety of audiences, enables opportunities to be exploited and adequately monetized.

This subject aims to train the student in the need to correctly visualize the data, as instruments that facilitate the recognition of patterns, the identification of relationships and trends that lead to rapid operational decision making. The idea is to take advantage of the capacity of the human mind to process images as a mechanism for a rapid comprehension of large amounts of information, reducing drastically the complex cognitive processes, and to use the appropriate communication tools that allow to transfer the acquired knowledge to the appropriate agents. The subject is divided into two differentiated and interconnected parts: one dedicated to the analysis and graphic representation of data and the other focused on aspects of communication.

## PREVIOUS KNOWLEDGE

### Relationship to other subjects of the same degree

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

### Other requirements

There are no specified enrolment restrictions with other subjects of the curriculum

No prerequisites. It is assumed that in order to successfully complete this subject the student has a basic level of mathematics (a level of knowledge corresponding to the first and second of Baccalaureate in the branch of science or social sciences).

## OUTCOMES

### 1332 - Degree in Business Intelligence and Analytics

- 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 have the ability to gather and interpret relevant data (usually in their field of study) to make judgements that take relevant social, scientific or ethical issues into consideration.
- Students must be able to communicate information, ideas, problems and solutions to both expert and lay audiences.
- Demonstrate skills for analysis and synthesis.



- Be able to analyse and search for information from diverse sources.
- Be able to learn autonomously.
- Be able to use ICT, both in academia and in professional practice.
- Be able to define, solve and present complex problems systemically.
- Be able to work in a team demonstrating commitment to quality, ethics, equality and social responsibility.
- Apply methods and techniques of analysis, synthesis and graphical representation by means of software tools.
- Communicate the results of analyses effectively.

## LEARNING OUTCOMES

The expected learning outcomes from this subject are the following:

- Know how to make different types of graphics through computer programs.
- Know how to extract, synthesize and communicate information in graphic form.
- Know the components of a graphic representation and the most effective way to communicate.
- Know how to search, select and assess the appropriate information for the analysis.
- Know how to use basic quantitative tools and their application to the economic environment.
- Know how to use basic communication tools and their application to the business environment.
- Know the different ways of communicating and how to do it more effectively.
- Know the components of a report, how to structure it and how to elaborate it effectively.
- Develop communication skills and their application to the business environment.

## DESCRIPTION OF CONTENTS

### 1. INTRODUCTION

1. Why make graphics?
2. Graphic representations and Exploratory Data Analysis.
3. Graphic representations and communication.
4. Graphics for analysis and graphics for publication.



## **2. TYPES OF GRAPHICS**

1. Basic graphics: Histograms, Bar charts, line charts, point clouds, stem-leaf and box-whisker plots, continuous histograms, sector diagrams, radar charts.
2. Advanced graphics: mosaic plots, path plots, sunflower plots, maps, cartograms, word-cloud plots, networks, etc.

## **3. COMPONENTS OF A GRAPHIC**

1. Labelling: title, subtitle, axes, labels, legends, comments.
2. Visual elements and dimensions: position, length, angle, direction, shapes, area, volume, colour, saturation, tonality.
3. Geometries.
4. Coordinate systems. Scales
5. The language of graphics.

## **4. GRAPHICS WITH R**

1. Base graphics.
2. Lattice.
3. ggplot2.
4. Interactive and dynamic graphics.

## **5. RMARKDOWN**

1. Text, code and outputs.
2. RMarkdown: communication, collaboration and work tool.
3. Output formats.
4. Components of a RMarkdown document: body, chunks and yaml.
5. Personalization.
6. Tables.
7. Automatic reports.

## **6. ELEMENTS OF COMMUNICATION**

1. Oral Communication.
2. Active listening.
3. Non-verbal communication.
4. Organization and elaboration of messages.

**7. EXECUTIVE SUMMARIES AND REPORTS**

1. Search and Organization of Information.
2. The summary, the synthesis and the paraphrase.
3. Structure of a Report.
4. Attitudes and ethics: plagiarism.

**8. DESIGN OF EFFECTIVE PRESENTATIONS: STAGES**

1. Preparation.
2. Design.
3. Execution.

**WORKLOAD**

ACTIVITY	Hours	% To be attended
Theory classes	30,00	100
Computer classroom practice	30,00	100
Study and independent work	50,00	0
Preparation of evaluation activities	20,00	0
Preparation of practical classes and problem	20,00	0
<b>TOTAL</b>	<b>150,00</b>	

**TEACHING METHODOLOGY**

The development of the subject is structured mainly around classes of a more theoretical content with situations and practical examples, and practical classes where the student will use case studies from the theory classes to apply their knowledge to practical situations. Depending on the type of class (theory or practical) a didactic or other teaching method will be chosen.

In the theory classes, which last 2 hours, the main contents of each topic that make up the subject will be presented, introducing the relevant elements and concepts and contextualizing them in the different fields of application of data analysis, the business environment and its application to the business world.

The predominant teaching method in the theory classes will be the participatory master class. This methodology makes it possible to manage large groups of students in an organized manner, offering the advantages of a master class without limiting the participation of students and the tutor-student interaction. It aims to encourage participation and discussion in the class in order to provide the student with a direct involvement with the content.

In the practical sessions, which last 2 hours, the tutor will give the students situations (real or fictitious) for problem solving or case studies which the student will need to resolve through the application of techniques and use of adequate computer programs, as well as giving oral presentations or debates where required, individually and/or as a team. In the practical classes, projects and situations will be proposed that the students will have to solve, delivering the outputs that are determined in a presentable manner and





on time.

## EVALUATION

The subject will be evaluated from the following three aspects:

- 1.- Theory/practical exam with the help of computer systems, in which a situation must be resolved by plotting a graph and interpreting the data provided in order to find answers to the questions posed;
- 2.- Evaluation of practical activities carried out by the student during the course, from the elaboration of tasks/work records and/or oral presentations, and ability to defend and justify his/her viewpoint;
- 3.-Continuous assessment of the student based on his/her participation and involvement in the teaching-learning process.

The percentages assigned will be specified in the Teaching Guide at the beginning of the course.

## REFERENCES

### Basic

- Fonseca, M.; Correa, A.; Pineda, M.; Lemus, F. (2011): Comunicación oral y escrita. México: Pearson Educación.
- Murrell, P. (2011). R Graphics, Chapman & Hall/CRC.
- Reynolds, G. (2010). Presentación Zen: ideas sencillas para el diseño de presentaciones. Madrid: Pearson Prentice Hall.
- Wickham H. (2016). ggplot2: Elegant graphics for data analysis, Springer.
- Wickham, H. y Golemund, G. (2017). R for Data Science. O'Reilly Media, Inc.
- Williams, J. M. y Bizup, J. (1990). Style: Lessons in clarity and grace, The University of Chicago Press.
- Xie, Y., Allaire, J.J. y Golemund, G. (2018). R Markdown: The definitive guide, Chapman & Hall/CRC.
- Yau, N. (2013). Data Points. Visualization that means something. Wiley.

### Additional

- Abril, M. (2003): Expresión y comprensión oral y escrita: actividades creativas. Málaga: Aljibe.
- Bivand, R. S., Pebesma, E. y Gómez-Rubio, V. (2013). Applied Spatial Data Analysis with R, Springer.
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- Friendly, M. y Meyer D. (2016). Discrete Data Analysis with R: Visualization and modeling techniques for categorical and count data, CRC Press.
- Heritage, K. (2002): Aprenda a redactar informes en una semana. Barcelona: Ediciones Gestión 2000, S.A.



- Knafllic, C.L. (2015). *Storytelling with Data: A data visualization guide for business professionals*, Wiley.
- Naciones Unidas (2009). *Cómo hacer comprensibles los datos. Parte 1. Una guía para escribir sobre números*.
- Naciones Unidas (2009). *Cómo hacer comprensibles los datos. Parte 2. Una guía para presentar estadísticas*.
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- Sarkar, D. (2008) *Lattice. Multivariate data visualization with R*, Springer.
- Tufte, E. (2001). *The Visual Display of Quantitative Information*. Graphics Press.
- Wickham H. (2015). *Advanced R*, Chapman & Hall/CRC.
- Zhu, H. (2019). *Create Awesome HTML Table with knitr::kable and kableExtra*.
- Zhu, H. (2019). *Create Awesome LaTeX Table with knitr::kable and kableExtra*.

## ADDENDUM COVID-19

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

### 1. Continguts / Contenidos

Se mantienen los contenidos inicialmente recogidos en la guía docente.

### 2. Volum de treball i planificació temporal de la docència

#### 2. Volumen de trabajo y planificación temporal de la docencia

- Se mantiene la carga de trabajo para el estudiante que marca el número de créditos, tal como indica la guía docente inicialmente.
- Los horarios de las sesiones presenciales se modifican. Se realizan videoconferencias grabadas de las clases teóricas, que están disponibles para el alumnado con dos días de antelación al horario presencial que originalmente tenían. En horario de clase se realiza una sesión online en directo para preguntas y dudas. Las sesiones prácticas también son grabadas y disponibles para el alumnado con la misma antelación, reservando la sesión online en directo para aclaraciones y dudas sobre la actividad solicitada.

### 3. Metodología docente

#### 3. Metodología docente

La docencia presencial se sustituye por videoconferencias grabadas, incluyendo transparencias y sesiones directas de tutorización a través de la plataforma Blackboard Collaborate, disponible en el Aula Virtual. Se hace uso del Aula virtual para cuestionarios de evaluación online sobre aspectos teóricos y para la entrega de tareas y actividades. Los materiales para el seguimiento de la asignatura (transparencias y otros documentos) se suben al Aula virtual, así como los enunciados de las actividades a realizar. El sistema de tutorías se realiza a través del fórum del Aula virtual y vía email.



#### **4. Avaluació**

##### **4. Evaluación**

La evaluación de la asignatura se distribuye de la siguiente manera, con la ponderación que se indica:

- Tareas evaluables realizadas en clase hasta la fecha de cierre de la actividad presencial (10%).
- Cuestionarios tipo test de evaluación de contenidos teóricos a realizar por el alumnado a través del Aula Virtual, a partir la materia pendiente desde el cierre de la actividad presencial (10%)
- Actividades entregables en Aula Virtual a partir de las sesiones prácticas de la asignatura (40%)
- Trabajo final de la asignatura en formato de Informe que recoja los conocimientos adquiridos a lo largo del curso (40%)

#### **5. Bibliografía**

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Se mantiene la bibliografía recomendada en la guía original.