1. BASIC INFORMATION

Course	Data Visualization
Degree program	Masters in Big Data Analytics
School	Escuela de Arquitectura, Ingeniería y Diseño
Year	1
ECTS	6
Credit type	Compulsory
Language(s)	English
Delivery mode	Face-to-face / Online
Semester	2
Academic year	2025-2026
Coordinating professor	Jairo García Fernández

2. PRESENTATION

6 ECTS credit module (150 hours). The importance of the subject Data Visualization within the curriculum is evident, as we are training future Big Data experts. Specifically, this subject focuses on visual analysis, both for data exploration and for the representation and communication of insights through visualization. Designing a data visualization efficiently and appropriately is an essential skill for working in the Big Data field.

3. LEARNING OUTCOMES

Knowledge

CON02. Explain how Big Data architectures and techniques are applied in the analysis of static and dynamic, structured and unstructured data.

Skills

HAB04. Apply different visualization metaphors, visual analytics, and the necessary technology for data interpretation.

HAB06. Use effective data visualization techniques to facilitate understanding when presenting conclusions supported by data analysis to both specialized and non-specialized audiences.

HAB09. Communicate both progress and results of data analysis projects effectively and in an executive manner.

Competences

CP04. Design and execute a complete knowledge discovery process, including the phases of data storage, processing, and visualization.

CP05. Apply data analysis techniques and both supervised and unsupervised machine learning models, even when the available information is incomplete or limited.

4. CONTENT

The subject is organized into learning units, which are in turn divided into topics:

- **Infographics and Visual Analytics**
- **Visualization Metaphors and Understanding Complex Models**
- **Visual Exploration and Reasoning**
- **Visual Data Mining**
- **Visualization Technologies**
- **Human–Computer Interaction Modes and Interfaces**

5. TEACHING-LEARNING METHODOLOGIES

The following types of teaching-learning methodologies will be applied:

- MD1: Face-to-face lecture or, if applicable, through the virtual campus
- MD2: Cooperative learning
- MD3: Problem-Based Learning (PBL)
- MD4: Group research (a) and/or (b) group problem-solving
- MD6: Simulation environments and field experiences

6. LEARNING ACTIVITIES

Listed below are the types of learning activities and the number of hours the student will spend on each one:

Campus-based mode:

Learning activity	Number of hours
Masterclasses	20
Individual Activities	35
Integrative Activities	15
Lab activities	10
Autonomous work	68
Exams and tests	2
TOTAL	**150**

Virtual mode:

Learning activity	Number of hours
Masterclasses	20
Individual Activities	35
Integrative Activities	15
Lab activities	10
Autonomous work	68
Exams and tests	2
TOTAL	**150**

7. ASSESSMENT

Listed below are the assessment systems used and the weight each one carries towards the final course grade:

Campus-based mode:

Assessment system	Weight
SE1: Exams	50%
SE2: Report writing	30%
SE3: Practical Use Cases	20%

Virtual mode:

Assessment system	Weight
SE1: Exams	60%
SE2: Report writing	25%
SE3: Practical Use Cases	15%

When you access the course on the *Campus Virtual*, you'll find a description of the assessment activities you have to complete, as well as the delivery deadline and assessment procedure for each one.

7.1. First exam period

To pass the course in the first exam period, you must obtain a final course grade of at least 5 out of 10 (weighted average).

In any case, you will need to obtain a grade of 4.0 in the final exam in order for it to count towards the final grade along with all the grades corresponding to the other activities.

7.2. Second exam period

To pass the course in the second exam period, you must obtain a final grade of at least 5 out of 10 (weighted average).

In any case, you will need to obtain a grade of at 4.0 in the final exam in order for it to count towards the final grade along with all the grades corresponding to the other activities.

The student must deliver the activities not successfully completed in the first exam period after having received the corresponding corrections from the professor, or those that were not delivered in the first place.

8. SCHEDULE

This table shows the delivery deadline for each assessable activity in the course:

Assessable activities	Deadline
Activity 1	Week 5
Activity 2	Week 7
Activity 3	Week 9
Activity 4	Week 11
Ordinary call	At the end of subject
Extraordinary call	First weekend of September

This schedule may be subject to changes for logistical reasons relating to the activities. The student will be notified of any changes as and when appropriate.

9. BIBLIOGRAPHY

The main reference work for this subject is:

- Bishop, C. M. (2006). Pattern Recognition and Machine Learning. Springer.
- Goodfellow, I., Bengio, Y., & Courville, A. (2016). Deep Learning. MIT Press.
- Murphy, K. P. (2012). Machine Learning: A Probabilistic Perspective. MIT Press.
- Hastie, T., Tibshirani, R., & Friedman, J. (2009). The Elements of Statistical Learning: Data Mining, Inference, and Prediction. Springer. 2ª edición.

- Shalev-Shwartz, S., & Ben-David, S. (2014). Understanding Machine Learning: From Theory to Algorithms. Cambridge University Press.
- Russell, S., & Norvig, P. (2020). Artificial Intelligence: A Modern Approach. Pearson. 4ª edición.
- Raschka, S., & Mirjalili, V. (2019). Python Machine Learning. Packt Publishing. 3ª edición.
- Géron, A. (2019). Hands-On Machine Learning with Scikit-Learn, Keras, and TensorFlow. O'Reilly Media. 2ª edición.
- James, G., Witten, D., Hastie, T., & Tibshirani, R. (2013). An Introduction to Statistical Learning: with Applications in R. Springer.
- Zhou, Z-H. (2021). Machine Learning. Springer. 2ª edición.

10. EDUCATIONAL GUIDANCE, DIVERSITY AND INCLUSION UNIT

From the Educational Guidance, Diversity and Inclusion Unit we offer support to our students throughout their university life to help them reach their academic achievements. Other main actions are the students' inclusions with specific educational needs, universal accessibility on the different campuses of the university and equal opportunities.

From this unit we offer to our students:

1. Accompaniment and follow-up by mean of counselling and personalized plans for students who need to improve their academic performance.
2. In terms of attention to diversity, non-significant curricular adjustments are made in terms of methodology and assessment for those students with specific educational needs, pursuing an equal opportunity for all students.
3. We offer students different extracurricular resources to develop different competences that will encourage their personal and professional development.
4. Vocational guidance through the provision of tools and counselling to students with vocational doubts or who believe they have made a mistake in their choice of degree.

Students in need of educational support can write to us at:

orientacioneducativa@universidadeuropea.es

11. ONLINE SURVEYS

Your opinion matters!

The Universidad Europea encourages you to participate in several surveys which help identify the strengths and areas we need to improve regarding professors, degree programs and the teaching-learning process.

The surveys will be made available in the “surveys” section on virtual campus or via e-mail.

Your assessment is necessary for us to improve.

Thank you very much for your participation.