1. BASIC INFORMATION

Course	Image and Video Analysis
Degree	Data Science
School/Faculty	School of Science, Engineering and Design
Year	4th
ECTS	6
Type	Elective
Language(s)	Spanish
Mode	On-site
Semester	7

2. COURSE DESCRIPTION

The course "Image and Video Analysis" is part of the elective courses in the final year of the bachelor's degree in data science. The course aims to provide students with the basic notions of image and video processing as well as the necessary skills to develop multimedia data analysis software applications.

The course is structured into 6 modules, each focusing on a different phase of image analysis (filtering, segmentation, transformation) and the application of current algorithms (object recognition, facial recognition), among others.

3. SKILLS AND LEARNING OUTCOMES

Basic skills:

- CB4 - Students should be able to convey information, ideas, problems, and solutions to both specialized and non-specialized audiences.

- CB5 - Students should have developed the learning skills needed to undertake further studies with a high degree of autonomy.

Transversal skills:

- CT2 - Autonomous learning: A set of skills to select strategies for searching, analysing, evaluating, and managing information from various sources, as well as to learn and apply independently what has been learned.
- CT3 - Teamwork: The ability to integrate and collaborate actively with others, areas, and/or organizations to achieve common goals.

- CT4 - Written/Oral Communication: The ability to transmit and receive data, ideas, opinions, and attitudes to achieve understanding and action, using spoken words and gestures for oral communication, and writing and/or graphic aids for written communication.

- CT5 - Problem-solving: The ability to critically evaluate information, break down complex situations into their constituent parts, recognize patterns, and consider alternative approaches and perspectives to find optimal solutions and efficient negotiations.

Specific skills:

- CE11 - The ability to apply machine learning techniques to design and implement applications and systems that use them, including those dedicated to the automatic extraction of information and knowledge from large volumes of data.

- CE1 - The ability to solve mathematical problems that may arise in engineering and data science by applying knowledge of linear algebra, geometry, differential and integral calculus, discrete mathematics, and optimization.

Learning outcomes:

Upon completing the course, the student will be able to:

- RA1: Work with multimedia material and apply modifications to achieve a specific goal.
- RA2: Synthesize material of a scientific and popular science nature.
- RA3: Apply the knowledge acquired through lectures to everyday aspects.
- RA4: Adapt the knowledge acquired to various application fields.
- RA5: Solve intermediate-level mathematical problems in the field of multimedia analysis.

4. CONTENT

The course is organized into six learning units:

- UNIT 1: Introduction to Human Visual Perception. Image and Video.
- UNIT 2: Filtering
- UNIT 3: Discrete Transformations
- UNIT 4: Segmentation
- UNIT 5: Object Detection and Facial Recognition
- UNIT 6: Application Fields

5. TEACHING-LEARNING METHODS

The following teaching-learning methods will be applied:

- Participatory lecture
- Problem-based learning
- Integrative projects

6. LEARNING ACTIVITIES

The following learning activities will be conducted, and the student's time dedication to each is identified:

Learning Activity Type	Number of hours
Lectures and practical seminars	60
Problem-solving	45
Independent study	30
Tutoring sessions	10
In-person knowledge assessments	5
TOTAL	150 hours

7. ASSESSMENT

The following assessment systems and their weight in the final grade are listed:

Assessment System	Weight
In-person tests to evaluate theoretical/practical objectives (multiple-choice tests, written presentations, oral presentations, case studies/problem-solving, debates, simulation tests)	55%
Non-in-person tests to evaluate theoretical/practical objectives (case studies/problem-solving)	25%
Tests to assess attitudes (evaluation rubrics for attitudes, class participation)	10%
Lab, workshop, or simulation tests (activity reports, oral presentations)	10%
TOTAL	**100%**

The course will not be graded if the student has not attended at least 50% of the classes, except for duly justified reasons.

Late submissions will not be accepted unless justified and communicated before the deadline.

Works with a plagiarism percentage higher than 20% will be severely penalized, resulting in a failure with a score of 0 points, and the student will not be allowed to resubmit in extraordinary calls.

A defense of the work by the student may be requested at any time if there is suspicion of the use of AI-based tools.

7.1. Regular Call

To pass the course in the regular call, a final grade equal to or greater than 50 out of 100 must be obtained in the weighted average.

Additionally, a minimum grade of 45 in the final exam and in the weighted average of continuous assessment is required for it to be averaged with the rest of the activities, as well as compliance with the attendance requirement mentioned above.

7.2. Extraordinary Call

To pass the course in the extraordinary call, a final grade equal to or greater than 50 out of 100 must be obtained.

It is also necessary to obtain a grade of 45 or higher in the final exam for it to be averaged with the rest of the activities.

Students must submit activities not passed in the regular call after receiving corrections, or those not submitted. Works detected with plagiarism cannot be resubmitted and will receive a score of 0 points.

8. BIBLIOGRAPHY

The reference work for the course is:

- Computer Vision. PDF format provided in the course.
- Learning OpenCV 3 Computer Vision with Python. Packt Publishing. Open Source. PDF.