

Course guide

205289 - FCT - Photography for Science and Technology

Last modified: 12/01/2026

Unit in charge: Terrassa School of Industrial, Aerospace and Audiovisual Engineering
Teaching unit: 748 - FIS - Department of Physics.

Degree: BACHELOR'S DEGREE IN AUDIOVISUAL SYSTEMS ENGINEERING (Syllabus 2009). (Optional subject).
BACHELOR'S DEGREE IN CHEMICAL ENGINEERING (Syllabus 2009). (Optional subject).
BACHELOR'S DEGREE IN ELECTRICAL ENGINEERING (Syllabus 2009). (Optional subject).
BACHELOR'S DEGREE IN INDUSTRIAL ELECTRONICS AND AUTOMATIC CONTROL ENGINEERING (Syllabus 2009). (Optional subject).
BACHELOR'S DEGREE IN MECHANICAL ENGINEERING (Syllabus 2009). (Optional subject).
BACHELOR'S DEGREE IN TEXTILE TECHNOLOGY AND DESIGN ENGINEERING (Syllabus 2009). (Optional subject).
BACHELOR'S DEGREE IN AEROSPACE TECHNOLOGY ENGINEERING (Syllabus 2010). (Optional subject).
BACHELOR'S DEGREE IN AEROSPACE VEHICLE ENGINEERING (Syllabus 2010). (Optional subject).
BACHELOR'S DEGREE IN INDUSTRIAL DESIGN AND PRODUCT DEVELOPMENT ENGINEERING (Syllabus 2010). (Optional subject).
BACHELOR'S DEGREE IN INDUSTRIAL TECHNOLOGY ENGINEERING (Syllabus 2010). (Optional subject).

Academic year: 2025 **ECTS Credits:** 3.0 **Languages:** English

LECTURER

Coordinating lecturer: Manel Soria

Others: Manel Soria

PRIOR SKILLS

On-campus course with fieldwork activities focused on practical work in astrophotography and entomological photography. Ability to work independently and as part of a team. Interest in scientific and technological photography. Ability to prepare and deliver oral presentations. Basic knowledge of Matlab. Elementary knowledge of the physics of light and optics. Ability to analyze and interpret experimental results. Basic proficiency in the use of computer tools for image and data processing.

TEACHING METHODOLOGY

Lectures, practical sessions, and group work.

LEARNING OBJECTIVES OF THE SUBJECT

To understand the technical foundations of photography, including sensors, optics, viewfinders, and shutters.
To understand the fundamentals of image processing, such as compressed and uncompressed image formats, and the use and interpretation of histograms.
To understand the characteristics of monochrome, RGB, multispectral, and hyperspectral images.
To become familiar with the main formal aspects of image composition, such as the rule of thirds, symmetry, and other compositional criteria.

To understand the concept of a photographic essay and to develop the ability to select and present one's own images in a coherent manner.
To understand the principles of technical macro photography and its main applications in scientific and technological contexts.
To understand the use of photography in zoology and botany, and to develop the ability to photograph plants and invertebrates in a way that allows for their identification.
To understand the main technical challenges of wide-field and telescopic astrophotography, and to develop criteria for the critical evaluation of astrophotographic images.

STUDY LOAD

Type	Hours	Percentage
Hours small group	30,0	40.00
Self study	45,0	60.00

Total learning time: 75 h

CONTENTS

Technical and formal foundations of photography

Description:

The photographic camera: sensor, optics, viewfinder, and shutter.
Image formats and image processing.
Monochrome, RGB, multispectral, and hyperspectral images.
Fundamentals of image processing using Matlab.
Principles of image composition.
The photographic essay.

Specific objectives:

To understand the functioning and main characteristics of the components of a photographic camera (sensor, optics, viewfinder, and shutter) and their influence on image formation.
To become familiar with the main image formats and the fundamentals of image processing, including the distinction between compressed and uncompressed formats.
To understand the different types of images (monochrome, RGB, multispectral, and hyperspectral) and their areas of application.

To introduce the fundamentals of image processing using Matlab applied to the analysis and enhancement of photographic images.
To identify and apply the main formal criteria of image composition.
To understand the concept of the photographic essay as a tool for visual communication and narrative, and to develop the ability to coherently analyze and select images.

Related activities:

Lectures
Guided image analysis sessions.
Introductory image processing practice using Matlab.
Photographic composition exercises.
Preparation of a short photographic essay in group.

Full-or-part-time: 25h

Theory classes: 10h
Self study : 15h



Technological and scientific applications of photography

Description:

1-Industrial macro photography

Introduction to macro photography.

Examples of applications in industrial and technological contexts.

2-Photography for the natural sciences

Photography of terrestrial invertebrates.

Photography applied to botany.

Camera trap photography.

3-Multispectral photography

Practical introduction to multispectral photography.

Detection and identification of plant species using multispectral photography.

4-Astrophotography

Introduction to astrophotography.

Wide-field astrophotography.

Telescopic astrophotography: observation of deep-sky objects and Solar System bodies.

Specific objectives:

Understand the main technological and scientific applications of photography

Understand the principles and applications of industrial macro photography

Apply macro photography techniques in technical and scientific contexts

Understand the use of photography in the natural sciences

Acquire criteria and skills for photographing invertebrates and plants for identification purposes

Understand the operation and applications of camera traps

Introduce the basic principles of multispectral photography

Apply multispectral photography to the detection of plant species

Understand the technical foundations of astrophotography

Identify the differences between wide field and telescopic astrophotography

Develop criteria for the evaluation of astrophotographic images

Related activities:

Lectures

Practical classes and field trips

Assessment of one's own work and that of classmates

Full-or-part-time: 50h

Theory classes: 20h

Self study : 30h

GRADING SYSTEM

Exam: 30%

Coursework and class participation: 30%

Project: 40%

Students who obtain a grade below 5 in the exam or in the project may sit an additional written examination covering the entire course content. This examination will take place on the date established in the final examination schedule.

The grade obtained in this additional examination, on a scale from 0 to 10, will replace only the component(s) with a grade below 5, provided that the new grade is higher, up to a maximum of 5 points.

EXAMINATION RULES.

All assessment activities will be conducted in person, and the use of any electronic devices will not be permitted, except those required for the presentations.

BIBLIOGRAPHY

Basic:

- Soriano, Tino. Ayúdame a mirar. La biblia del reportaje gráfico. 2019. ISBN 8441541337.
- Soriano, Tino. Los colores y tú: entender el color y las emociones en la fotografía. 2021. ISBN 8441543747.
- Soria Guerrero, Manel; Eritja, Roger. Astrofotografía de paisaje: más que una guía para disfrutar del paisaje estrellado con nuestra cámara. [Barcelona]: Manel Soria y Roger Eritja, [2015]. ISBN 9788460674405.