

Course guide

370039 - FOTOG - Photography

Last modified: 13/06/2025

Unit in charge: Terrassa School of Optics and Optometry
Teaching unit: 731 - OO - Department of Optics and Optometry.

Degree: BACHELOR'S DEGREE IN OPTICS AND OPTOMETRY (Syllabus 2020). (Optional subject).

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

LECTURER

Coordinating lecturer: Perez Cabre, Elisabet (<https://futur.upc.edu/ElisabetPerezCabre>)

Others: Perez Cabre, Elisabet (<https://futur.upc.edu/ElisabetPerezCabre>)

PRIOR SKILLS

Basic knowledge of Geometrical Optics.

TEACHING METHODOLOGY

Lectures by the professor, laboratory and field work, group work, exhibitions of student work.

LEARNING OBJECTIVES OF THE SUBJECT

1. Learn how the pinhole camera works.
2. Learn the basic operation of digital cameras.
3. Learn the basic operation of the smartphone cameras.
4. Take photos with the smartphone camera using the camera's own software.
5. Take photos with the smartphone camera using specific software that allows you to vary different parameters of the shooting mode (ProShot, ProCam).
6. Learn different photographic capturing techniques (Bracketing), panoramic and HDR.
7. Learn the basics of digital imaging.
8. Learn the basic rules of photographic composition
9. Introduction to motion capture
10. Introduction to lighting and shadows
11. Introduction to digital image processing with free software (Photopea, Snapseed).
12. The histogram and layers.

STUDY LOAD

Type	Hours	Percentage
Self study	45,0	60.00
Hours medium group	22,5	30.00
Hours small group	7,5	10.00

Total learning time: 75 h

CONTENTS

The photographuc camera

Description:

1. Types of cameras according to their lens:
 - 1.1 Dioptric/catadioptric lens camera
 - 1.1 Pinhole lens camera
2. Types of cameras according to their sensor:
 - 2.1 Analogic camera
 - 2.2 Digital
3. Elements of the camera:
 - 3.1 The lens
 - 3.2 The sensor
 - 3.3 The exposure meter
 - 3.4 The display

Full-or-part-time: 10h

Practical classes: 4h

Self study : 6h

The photographic image

Description:

1. Focal and format
2. Camera kind
 - 2.1 APS format and smart mobile phone format
 - 2.2 Small format
 - 2.2.1 The reflex camera
 - 2.3 Medium Format
 - 2.4 Large Format
3. Crop factor
4. Equivalent focal
5. Angular field
 - 5.1 Wide angle lens
 - 5.2 Normal lens
 - 5.3 Telephoto lens
6. Image perspective
 - 6.1 Perspective and focal
 - 6.2 Deformations due to magnification

Full-or-part-time: 10h

Practical classes: 4h

Self study : 6h

Image lighting

Description:

1. Exposure time t
2. F-number $f/\#$
3. Sensor sensitivity S
4. The exposure
5. The triangle $t, f/\#, S$
6. Image histogram
7. Relationship $L-N^2 / t$
4. Noise and sensitivity
7. Sensor sensitivity
8. The exposure value (EV)
9. Noise and sensitivity
10. The gray card
11. The exposure meter
- 11.1 Light incident
- 11.2 Light reflected
12. White balance

Full-or-part-time: 10h

Practical classes: 4h

Self study : 6h

Image sharpening

Description:

1. The circle of tolerance
2. Need for unsharp mask on a digital camera
3. Depth of focus and field
4. The hyperfocal distance
5. Parameters that affect depth of field and focus.
5. Relationship between depth of field and magnification

Full-or-part-time: 10h

Theory classes: 4h

Self study : 6h

Photographic system quality

Description:

1. Image resolution
2. Measurement of image resolution
3. Image contrast
4. Measurement of image contrast
5. The image sharpness
6. Measurement of sharpness by means of MTF
7. MTF measurement by the method of the slanted edge (SET)
6. Quality parameters of photographic system

Full-or-part-time: 10h

Practical classes: 4h

Self study : 6h

Photographic image processing

Description:

1. What is a digital image
2. The bit depth
3. The digital color image. The Bayer filter and demosaicing
4. The black and white digital image
5. The digital archive. Type according to file compression.
6. Image size and resolution
7. What is image processing?
8. Basic functions: Histogram and layers

Full-or-part-time: 10h

Theory classes: 4h

Self study : 6h

GRADING SYSTEM

Continuous evaluation.

Attendance at practice sessions is mandatory.

The final grade NF will be the average of the three works (T1-33%, T2-33% and T3-34%) that will be carried out during the course.

$NF = (T1 + T2 + T3)/3$

Reevaluation for students that have failed with a grade equal to or greater than 3.5: One single theoretical exam of 100% weight.

BIBLIOGRAPHY

Basic:

- Adams, Ansel; Baker, Robert. The camera. Boston [etc.]: Little, Brown and Company, 1980. ISBN 0821210920.
- Jacobson, R. E. Manual de fotografía: fotografía e imagen digital. 9a ed. Barcelona: Omega, 2002. ISBN 8428212813.
- Langford, Michael John. Tratado de fotografía: un texto avanzado para profesionales. Barcelona: Omega, 1972. ISBN 8428203482.
- Allen, Elizabeth; Triantaphillidou, Sophie. The manual of photography. Tenth edition. Burlington, MA: Focal Press, 2009. ISBN 9780240520377.
- González, Rafael C; Woods, Richard E. Digital image processing [on line]. Fourth edition, Global edition. New York: Pearson Education Internacional, Pearson [Consultation: 04/12/2024]. Available on: <https://ebookcentral-proquest-com.recursos.biblioteca.upc.edu/lib/upcatalunya-ebooks/detail.action?pq-origsite=primo&docID=5573669>. ISBN 9781292223049.
- London, Barbara; Upton, John. Photography. 6th ed. New York: Longman, cop. 1998. ISBN 0321011082.
- Fiete, Robert D. Modeling the imaging chain of digital cameras [on line]. Bellingham, Wash.: SPIE Press, 2010 [Consultation: 16/09/2024]. Available on: <https://ebookcentral-proquest-com.recursos.biblioteca.upc.edu/lib/upcatalunya-ebooks/detail.action?pq-origsite=primo&docID=728496>. ISBN 9780819483393.
- Fiete, Robert D. Formation of a digital image: the imaging chain simplified. Bellingham: SPIE Press, cop. 2012. ISBN 9780819489760.
- Teubner, Ulrich; Brückner, Hans Josef. Optical imaging and photography: imaging optics, sensors and systems. 2nd revised and extended edition. Berlin: De Gruyter, [2024]. ISBN 9783110789904.

RESOURCES

Other resources:

Camera Sim: <https://www.camerasim.com/original-camerasim> [visitat el 9/6/2025]

Exposure Contraption: <https://www.camerasim.com/exposure-contraption> [visitat el 9/6/2025]

Camera Sim 3D: <https://www.camerasim.com/camerasim3d> [visitat el 9/6/2025]

DOF Simulator: <https://dofsimulator.net/en/> [visitat el 9/6/2025]