![UNIVERSITAT POLITÈCNICA DE CATALUNYA BARCELONATECH]

# Course guide
# 370039 - FOTOG - Photography

| | |
|---|---|
| **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:** 2023   **ECTS Credits:** 3.0   **Languages:** Catalan

## LECTURER

**Coordinating lecturer:**          Escofet Soteras, Jaume

**Others:**          Escofet Soteras, Jaume

## 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. To know how pinhole camera works.
2. To know how digital camera works.
3. To make a pinhole camera.
4. To take pictures with a pinhole camera.
5. To know the developing process of the photo reel and the photographic paper in the laboratory.
6. To make photographic developing with paper in the laboratory.
7. To take pictures with analogues and digitals cameras controlling the various settings of the shooting mode of the camera.
8: To measure the light in the scene by means of differents exposimeters.
9. To know different techniques of photographic capture (Bracketing), panoramic and HDR photographs.
10. To know the fundamentals of digital imaging.
11. Introduction to digital image processing with free and commercial software (Photopea, Snapseed, Photoshop, Lightroom,...).
12. The histogram and the 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 sensivity S
4.The exposure
5. The triangle t, f/#, S
6. Image histogram
7. Relationship L-N2 / 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 demosaizing
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.
The final grade NF will be the average of the 4 works (T1, T2, T3, T4) that will be carried out during the course..
NF = 0.25*T1+0.25*T2+0.25*T2+0.25*T4

## BIBLIOGRAPHY

**Basic:**
- Langford, Michael John. Tratado de fotografía : un texto avanzado para profesionales . Barcelona : Omega, 1972. ISBN 8428203482.
- González, Rafael C; Woods, Richard E. Digital image processing . 3rd ed., international ed. Upper Saddle River : Pearson Education Internacional, cop. 2010. ISBN 9780132345637.
- Fiete, Robert D. Modeling the imaging chain of digital cameras . Bellingham, Wash. : SPIE Press, 2010. ISBN 9780819483393.
- Fiete, Robert D. Formation of a digital image : the imaging chain simplified . Bellingham : SPIE Press, cop. 2012. ISBN 9780819489760.
- 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.
- Allen, Elizabeth; Triantaphillidou, Sophie. The Manual of photography . Tenth edition. Burlington, MA : Focal Press, 2009. ISBN 9780240520377.
- London, Barbara; Upton, John. Photography . 6th ed. New York : Longman, cop. 1998. ISBN 0321011082.
- 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.