COURSE DATA

Data Subject	
Code	34314
Name	Registry and processing of clinical images
Cycle	Grade
ECTS Credits	6.0
Academic year	2022 - 2023

Study (s)

Degree	Center	Acad. year	Period
1207 - Degree in Optics and Optometry	Faculty of Physics	4	First term

Subject-matter

Degree	Subject-matter	Character
1207 - Degree in Optics and Optometry	16 - Optional subjects	Optional
1207 - Degree in Optics and Optometry	19 - Biomedical optics	Optional

Coordination

Name	Department
BARREIRO HERVAS, JUAN CARLOS	280 - Optics and Optometry and Vision Sciences
GARCIA MARTINEZ, PASCUALA	280 - Optics and Optometry and Vision Sciences

SUMMARY

Technological advance has not been alien to the health sciences. Understand the registration processes and Imaging using electronic sensors is relevant to any professional who work in the health field. Treatment of clinical images or microscope images Electronic generated great interest from the beginning of the so-called digital age. Many clinical teams, provide information through digital images: X-rays, ultrasounds, MRIs, CT scans, etc. that were traditionally recorded on film. In optometric clinics, find video keratographs, slit lamps and ophthalmoscopes that allow a study efficient ocular system. An adequate treatment of the images obtained by these methods makes a lot of hidden information appear, greatly facilitating diagnosis final.

PREVIOUS KNOWLEDGE

Relationship to other subjects of the same degree

There are no specified enrollment restrictions with other subjects of the curriculum.

Other requirements

Prior knowledge of geometric and instrumental optics is required. It is also required very basic knowledge of Fourier analysis.

OUTCOMES

1207 - Degree in Optics and Optometry

- To have and to understand the fundamentals of Optometry for its correct clinical and healthcare application.
- Knowing how to apply the knowledge acquired to professional activity, knowing how to solve problems and develop and defend arguments.
- Being able to gather and interpret relevant data to make judgments.
- Being able to transmit information, ideas, problems and solutions to both a specialized and non-specialized audience.
- Development of learning skills necessary to undertake further studies with a high degree of autonomy.
- To know the applicable legislation in professional practice, with special attention to matters of gender equality between men and women, human rights, solidarity, sustainability, protection of the environment and promotion of the culture of peace.
- To know the fundamentals of analog and digital photography.
- To recognize the type of target suitable for different clinical applications and its relationship with the resolution of the recording medium.
- To acquire basic skills to handle photographic and video instruments.
- To know the basic elements of optical and digital image treatment.
- To recognize the prominent elements in a digitally processed medical image.

LEARNING OUTCOMES

It is intended that students master and understand the processes of image capture and registration, both its formation through photographic optics and its recording in analog media and digital. It is also interesting that students understand the internal structure of digital images as well as the different encoding and storage formats they can use. Finally they tries to know the suitable commercial software to carry out the study of the images.

DESCRIPTION OF CONTENTS

1. Formation of the photographic image

2. Photographic image registration

3. Image structure and coding

4. Image manipulation techniques

6. Laboratory practices

PRACTICE 1: Handling the digital camera I.
PRACTICE 2: Handling the digital camera II.
PRACTICE 3: Introduction to the digital laboratory. Basic management of THE GIMP Program.
PRACTICE 4: Image formats. Compression. (THE GIMP).
PRACTICE 5: Transformations of images and histograms. (THE GIMP).
PRACTICE 6: Biometrics. IMAGEJ program.
PRACTICE 7: Restoration of images. (IMAGEJ).
PRACTICE 8: Edges and layers. (THE GIMP).

WORKLOAD

ACTIVITY	Hours	% To be attended
Theory classes	30,00	100
Laboratory practices	30,00	100
Development of group work	10,00	0
Development of individual work	10,00	0
Readings supplementary material	10,00	0
Preparing lectures	30,00	0
Preparation of practical classes and problem	30,00	0
TOTAL	**150,00**	

TEACHING METHODOLOGY

In this subject it is intended that the student knows the basic tools to understand the formation, registration and subsequent processing of digital images. For this, the subject will consist of two types of classes with differentiated methodology:

(i) Theoretical-practical classes.

(ii) Laboratory sessions including computer room.

In the classes of type (i) the basic theoretical contents of the subject will be taught, as well as practical examples that best illustrate them. To increase the presentation / assimilation ratio, they will be able to use graphic tools to present content, through transparencies, including graphics, drawings, videos and animations, in combination with discussions / presentations in board. Likewise, simple practical demonstrations may be presented, especially examples relevant, applets, simulations, etc., that allow to illustrate some of the concepts explained. I know will encourage and guide students in expanding the content received in each class through the recommended bibliography, as well as the possibility of expanding knowledge in subject future.

In the classes of type (ii), the laboratory activities will be based on the use of the digital camera as well as in the use of suitable commercial image analysis software. The use of of databases of clinical cases so that students become familiar with the type of images that are you will find in professional practice

EVALUATION

The evaluation system will take into account the contribution of the theoretical part as well as the part practice given in the laboratory and in the computer room. In addition, the delivery of Practical jobs.

At the end of the course there will be a written exam that will cover both theoretical knowledge as practical, which will account for 60% of the final grade. The assessable works will consist of the realization of a memory of the practical experiences carried out, as well as in the resolution of exercises with the software used. These works will account for the remaining 40% of the final grade

REFERENCES

Basic

- 1.1. R. P. Novell, F. C. Zwahlen y J. A. Folts. Manual completo de fotografía. Celeste Ediciones (1998).
  1.2. M. Langford y P. Andrews, Manual de Fotografía, Omega (2006).
  1.3. M. Martínez Corral, W. Furlan, A. Pons y G. Saavedra. Instrumentos ópticos y optométricos. Teoría y prácticas. Universitat de Valéncia (1998).
  1.4. A. de la Escalera, Visión por computador. Fundamentos y métodos. Prentice Hall (2000).

1.5. J. F. Pertusa, Técnicas de Análisis de Imagen. Universitat de València (2003).

Additional

- 2.1. J. Odam, Fotografía digital. Anaya Multimedia (2000).
  2.2. R. C. Gonzalez y R. E. Woods, Digital Image Processing 2nd Ed. Prentice Hall (2002).