60041 - Imaging techiques and radiophysics

Información del Plan Docente

Academic Year	2017/18
Faculty / School	100 - Facultad de Ciencias
Degree	538 - Master's in Physics and Physical Technologies
ECTS	5.0
Year	1
Semester	Second semester
Subject Type	Optional
Module	---

1.General information

1.1.Introduction

1.2.Recommendations to take this course

1.3.Context and importance of this course in the degree

1.4.Activities and key dates

2.Learning goals

2.1.Learning goals

2.2.Importance of learning goals

3.Aims of the course and competences

3.1.Aims of the course

The main objective is that students become familiar with the physical and mathematical basis of the various techniques of digital image processing and radiation techniques, and be able to solve problems that arise in their scientific field through the appropriate use of IT tools based on them.

3.2.Competences

4.Assessment (1st and 2nd call)

4.1.Assessment tasks (description of tasks, marking system and assessment criteria)

1. Continuous assessment of student learning by solving problems, issues, reports, papers and other activities proposed by teachers (70%).

2. Practical work in the laboratory and / or computer room (30%).

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Single global test. Theoretical and practical examination at the end of the course: theory (70%), practical (30%).

5.Methodology, learning tasks, syllabus and resources

5.1.Methodological overview

During the course, the student has to acquire theoretical and practical knowledge on digital image processing and radiotherapy techniques. Therefore, the followed methodology is based on lectures (2.5 ECTS), in which there are explanations on the physical and mathematical foundations, the different techniques of digital image processing and radiotherapy techniques; problem-solving sessions (1 ECTS), practice sessions to put into practice techniques databases of images and commercial programs (1 ECTS); and laboratory sessions with radiation detectors (0.5 ECTS).

5.2.Learning tasks

The course includes the following learning tasks:

- Lectures on the main concepts (2.5 ECTS).
- Practice sessions in computer room (1 ECTS). Students learn to handle appropriate tools to develop different processing techniques seen in lectures. It includes the implementation of different techniques programmatically and using programs specific for commercial image processing.
- Problem-solving sessions (1 ECTS).
- Laboratory sessions (0.5 ECTS). Students will characterize radiation detectors and its possible applications in radiotherapy and image production.

5.3.Syllabus

The course will address the following topics:

1. INTRODUCTION TO DIGITAL IMAGE PROCESSING
2. CHANGES IN INTENSITY AND SPATIAL FILTERING
3. FILTERING IN THE FREQUENCY DOMAIN
4. IMAGE RESTORATION
5. IMAGE SEGMENTATION
6. IN COLOR IMAGE PROCESSING
7. APPLICATION OF DIGITAL IMAGE PROCESSING
8. IMAGE IN MEDICINE
9. RADIOTHERAPY TECHNIQUES

5.4.Course planning and calendar

Further information concerning the timetable, classroom, assessment dates and other details regarding this course, will be provided on the first day of class or please refer to the Faculty of Science http://ciencias.unizar.es/

5.5.Bibliography and recommended resources