

# ACQUISITION AND RECONSTRUCTION

## 1. SYLLABUS INFORMATION

### 1.1. Course title

Acquisition and Reconstruction

### 1.2. University

University of Bordeaux

### 1.3. Semester

2<sup>nd</sup> year, 1<sup>st</sup> semester

## 2. COURSE DETAILS

### 2.1. Course nature

Compulsory

### 2.2. ECTS Credit allotment

3

### 2.3. Recommendations

Basic knowledge in Image Processing, Python programming

### 2.4. Faculty data

Prof. Pascal Desbarats -LaBRI - [firstname.lastname@u-bordeaux.fr](mailto:firstname.lastname@u-bordeaux.fr)

## 3. COMPETENCES AND LEARNING OUTCOMES

### 3.1. Course objectives

The goal of this course is to understand the principles of 2D/3D imaging, from physics and acquisition to image reconstruction, analysis, and visualization. It gives an overview of several imaging modalities and it is exemplified through a variety of application fields (medical, astrophysical, remote-sensing,...). The students will learn how to implement a processing chain from the physical acquisition of data to the visualization and analysis of images. They will also understand the specificities of stereoscopic, volumetric and surfacic 3D images.

### 3.2. Course contents

1. Volumetric Imaging (voxel images)
  - From Radiography to CT scan-MRI and its different modalities
  - Nuclear medicine imaging (SPECT, PET)
2. Surfacic and Depth Imaging (point clouds, meshes, depth maps)
  - Laser scan-Stereo and depth camera
  - Mono camera

### 3.3. Course bibliography

- N. Barrie Smith and A. Smith, «Introduction to Medical Imaging: Physics, Engineering and Clinical Applications», Cambridge University Press, 2010
- T. Luhmann, S. Robson, S. Kyle, J. Boehm. «Close-Range Photogrammetry and 3D Imaging», De Gruyter Editions, 2014

## 4. TEACHING-AND-LEARNING METHODOLOGIES AND STUDENT WORKLOAD

| Activity              | Hours |
|-----------------------|-------|
| Lectures              | 12    |
| Computer lab          | 12    |
| Assessment activities | 1     |

## 5. EVALUATION PROCEDURES AND WEIGHT OF COMPONENTS IN THE FINAL GRADE

- Lab assignments: 50%
- Exam: 50% Part