

## COURSE SYLLABUS

### Imaging

2223-1-H4102D004-H4102D012M

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### Aims

Knowledge of digital image generation and image processing technologies; structural quantification and functional analysis of images of biological structures, at macro and microscopic level. This will include image storage, processing by filtering, segmentation, registration, computational techniques for the functional evaluation of three-dimensional structures, as well as the practical use of software dedicated to the processing of medical images.

### Contents

Fundamentals in medical device for digital image generation.

Numerical techniques for generation of digital images, storage and processing; Generation of surface models and graphical visualization, Processing of image data and structural quantification.

### Detailed program

Instrumentation and signal processing for image generation, technologies and algorithms for storing and processing digital images; Image formats and storage systems; Histogram operations and mathematical morphology techniques; Recognition of objects by automatic image segmentation techniques; Numerical generation of surface models and visualization techniques; Recording of spatial and temporal images for different acquisition modes; Numerical analysis for structural quantification; Visualization and rendering techniques; Generation of digital models for stereoscopic visualization and 3D printing.

## **Prerequisites**

Basic knowledge in mathematics, algebra and physics

## **Teaching form**

Lessons in class, demonstrations by the use of digital image processing software and quantitative solution of simple problems.

## **Textbook and teaching resource**

Suggested textbook: The Image Processing Handbook, Seventh Edition, John C. Russ,? F. Brent Neal, CRC Press  
ISBN-10: 149874026X.

Open-source software for DICOM image visualization and processing.

Slides of the course will be transmitted to the students using the e-learning platform

## **Semester**

First semester

## **Assessment method**

Assessment will consist of a final written and an oral examination accounting for 60% and 40% of the final evaluation, respectively.

## **Office hours**

Monday, 4 to 6 PM (Dalmine and by remote call)

## **Sustainable Development Goals**

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