

## Course introduction

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### **Methods for Image Processing**

academic year 2018–2019

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Office hours: Monday h. 16:00 (in Milan)  
by appointment (in Crema)

## Timetable

<b>Day</b>	<b>Time</b>	<b>Room</b>
Monday	13:30–15:00	Alfa(?)
Wednesday	15:30–17:30	Alfa(?)

Streamed in Crema

## Course structure

- ▶ Frontal lessons
- ▶ Laboratory exercise
  - ▶ experimentation with techniques seen at lesson
  - ▶ Matlab

## Course assessment

- ▶ Written exam (10–18/30) + oral exam (5–15/30)
- ▶ exams calendar ASAP

## Course materials



- ▶ R.C. Gonzalez and R.E. Woods, *Digital Image Processing*, Prentice Hall, 2008, 3rd edition.



- ▶ R.C. Gonzalez e R.E. Woods, *Elaborazione delle immagini digitali*, Pearson Education Italia, 2008, terza edizione.

- ▶ Errata sheet: [http://www.imageprocessingplace.com/downloads\\_V3/dip3e\\_downloads/dip3e\\_errata\\_sheet/DIP3E\\_Errata\\_Sheet.zip](http://www.imageprocessingplace.com/downloads_V3/dip3e_downloads/dip3e_errata_sheet/DIP3E_Errata_Sheet.zip)

The course syllabus follows the topics covered in the textbook.  
Only few notes are not present in the book:

- ▶ lecture notes on the course website.

For the exams, the assessed syllabus concerns the topics covered by the adopted textbook.

## Course goals

- ▶ Learning the basic concepts of the automatic processing of *digital* images:
  - ▶ acquisition and representation;
  - ▶ enhancement;
  - ▶ information extraction from an image.
- ▶ Implementing some simple image processing techniques by using a numerical computing program.

## Syllabus

**Introduction** image basic concepts, image processing applications.

**Digital images fundamentals** light, vision and perception; acquisition and digitalization of images.

**Representation** formats for the representation of digital images, pixel relations, basic mathematical operations.

**Intensity transforms and spatial filtering** intensity transforms, histograms, equalization, spatial domain filtering, equalization, image improvement in spatial domain.

**Filtering in the frequency domain** Discrete Fourier Transform, extension to 2D functions, filtering and improvement of images in the frequency domain.

**Morphological processing** dilation, erosion, opening, closing, extraction of connected components, convex hull, thinning, thickening, contour extraction.

**Segmentation** edge detection and linking, region based processing.

**Compression** redundancy, image encoding.

## Extended syllabus

Almost impossible in 48 hours, but maybe:

**Image restoration** noise models, motion blur, deconvolution.

**Image restoration** image inpainting.

**GPU programming** parallel architecture for image processing.

## Timing and calendar

- ▶ How use the “academic quarter”?
- ▶ Any calendar change proposal?