Summary
Introduction to the basic techniques of image processing. Introduction to the development of image-processing software and to prototyping in JAVA. Application to real-world examples in industrial vision and biomedical imaging.

Content
- Characterization of continuous images. Image classes. 2D Fourier transform. Shift-invariant systems.
- Introduction to image analysis and computer vision. Segmentation, edge detection, objet detection, image comparison.

Learning Prerequisites

Required courses
Signals and Systems I & II (or equivalent)

Important concepts to start the course
1-D signal processing: convolution, Fourier transform, z-transform

Learning Outcomes
By the end of the course, the student must be able to:
• Exploit the multidimensional Fourier transform
• Select appropriately Hilbert spaces and inner-products
• Optimize 2-D sampling to avoid aliasing
• Formalize convolution and optical systems
• Design digital filters in 2-D
• Analyze multidimensional linear shift-invariant systems
• Apply image-analysis techniques
• Construct image-processing software
• Elaborate morphological filters

Transversal skills

• Use a work methodology appropriate to the task.
• Manage priorities.
• Use both general and domain specific IT resources and tools