MICRO-512  Image processing II  
Liebling Michael, Sage Daniel, Unser Michaël, Van De Ville Dimitri

**Cursus**

<table>
<thead>
<tr>
<th>Subject</th>
<th>Sem.</th>
<th>Type</th>
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<tbody>
<tr>
<td>Biocomputing minor</td>
<td>E</td>
<td>Opt.</td>
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<tr>
<td>Computational Neurosciences minor</td>
<td>E</td>
<td>Opt.</td>
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<tr>
<td>Computational science and Engineering</td>
<td>MA2, MA4</td>
<td>Opt.</td>
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<tr>
<td>Computer science</td>
<td>MA2, MA4</td>
<td>Opt.</td>
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<td>Cybersecurity</td>
<td>MA2, MA4</td>
<td>Opt.</td>
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<tr>
<td>Digital Humanities</td>
<td>MA2, MA4</td>
<td>Opt.</td>
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<tr>
<td>Environmental Sciences and Engineering</td>
<td>MA2, MA4</td>
<td>Opt.</td>
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<td>Life Sciences Engineering</td>
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<td>Opt.</td>
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<td>Microtechnics</td>
<td>MA2, MA4</td>
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<td>Neuroprosthetics minor</td>
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<td>Photonics minor</td>
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<td>Robotics, Control and Intelligent Systems</td>
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<td>Robotics</td>
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<tr>
<td>SC master EPFL</td>
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**Summary**

Study of advanced image processing; mathematical imaging. Development of image-processing software and prototyping in JAVA; application to real-world examples in industrial vision and biomedical imaging.

**Content**

- **Deconvolution.** Inverse and Wiener filtering. Matrix formulations. Iterative techniques (ART).

**Learning Prerequisites**

**Required courses**

Image Processing I

**Recommended courses**
Signals and Systems I & II, linear algebra, analysis

Important concepts to start the course
Basic image processing and related analytical tools (Fourier transform, z-transform, etc.)

Learning Outcomes
By the end of the course, the student must be able to:
• Construct interpolation models and continuous-discrete representations
• Analyze image transforms
• Design image-reconstruction algorithms
• Formalize multiresolution representations using wavelets
• Design deconvolution algorithms
• Perform image analysis and feature extraction
• Design image-processing software (plugins)
• Synthesize steerable filters

Transversal skills
• Plan and carry out activities in a way which makes optimal use of available time and other resources.
• Manage priorities.
• Access and evaluate appropriate sources of information.
• Use both general and domain specific IT resources and tools

Resources
Moodle Link
• https://go.epfl.ch/MICRO-512