

# Application Oriented Image Analysis

ECTS credits: 8 for the whole course, 5 for a shorter version

Course period: October-December 2016

Maximum number of participants: 60

## **Aim of course**

Today, many research projects at the TekNat Faculty, in areas as diverse as biology, chemistry, materials science, and astronomy, require imaging and the analysis of images<sup>1</sup>. Computerized image analysis has become an indispensable tool for objective, quantitative and fast analysis of large amounts of image data. Such analyses are often needed to extract specialized knowledge and increase the scientific value of image-based experiments. A number of computerized image analysis tools are available, but in order to use them in a correct and meaningful way, a basic understanding of the underlying methods is necessary. This course aims at giving doctoral students from across the faculty sufficient understanding to solve basic computerized image analysis problems. The course will also offer an introduction to a number of freely available software tools, preparing the students to start using computerized image analysis in their own research.

Students from our own division are not expected to take this course.

## **Contents, study format and form of examination**

The focus of the course is on reaching a broad understanding of computerized image analysis and a basic understanding of the theory and algorithms behind the computerized image analysis methods. The course starts with basic computerized image analysis methods and computer exercises, including computerized image analysis research methodology and computerized image analysis research ethics. In the second part of the course, participants choose at least four lectures to tailor the course to match their own research interest (see Fig 1).

The examination will be divided into

- three computer exercises, both to get familiar with the interfaces of common software and to solve realistic image processing problems,
- a written exam on part 1,
- a project (oral presentation and written report), where the course participants apply the collected knowledge to a project within their own domain.

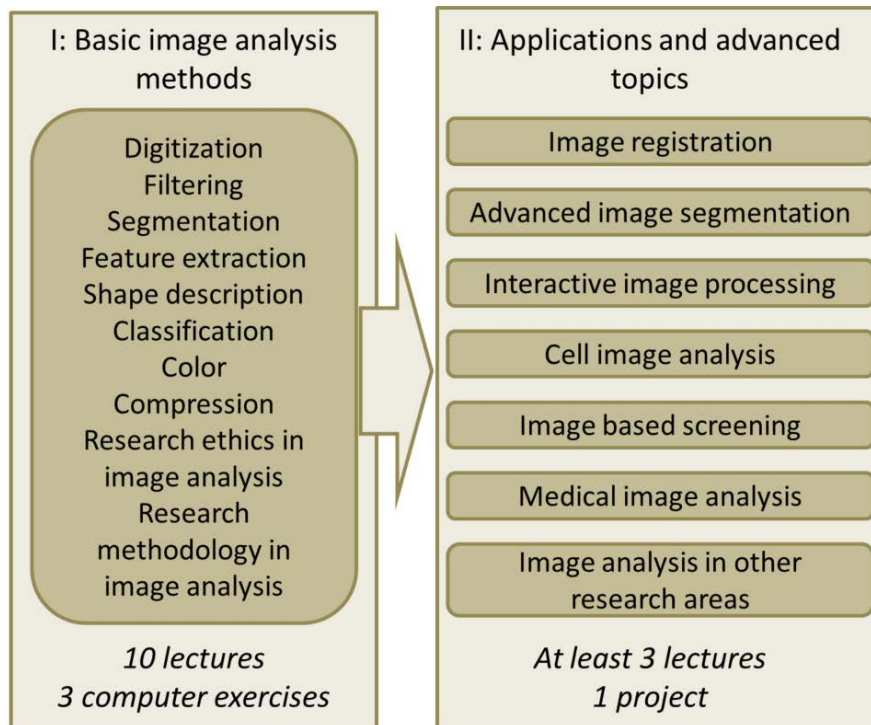
The course participants will study literature relevant to their project, practice their ability to scientific analyses, find and test appropriate computerized image analysis methods, and present and discuss their scientific results. The course participants will get eight credits for taking the whole course, or five credits for taking part 1.

[Content for the 5 credits course](#)

[Content for the 8 credits course](#)

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<sup>1</sup>See the research projects, list of publications and list of cooperation partners in the Centre for Image Analysis Annual report, [www.cb.uu.se/annual\\_report/AR2014.pdf](http://www.cb.uu.se/annual_report/AR2014.pdf)



**Figure 1:** Course structure. The lectures in the second part will be adjusted to match the students' research interest.

### Target group/s and recommended background

The target group is graduate students from all subjects where computerized image analysis is used as a research tool. No previous experience in computerized image analysis is required from the course participants, but an interest in its potential as a tool in their own research is important. The course can be followed with a basic knowledge of mathematics (corresponding to upper- secondary level entry requirements) and basic computer skills.

In the second part of the course, we plan to have a set of lectures focused on computerized image analysis usage in the research domains in which we have extensive experience. To match all students' interests, we will use our computerized image analysis network and tailor lectures/literature suggestions to fit specific research areas where computerized image analysis is used.

### Department with main responsibility

Dept. of Information Technology, Division of Visual Information and Interaction, Vi2

### Course coordinators:

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Application from course participants should be sent to

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not later than October 1 2016