# Image Processing and Analysis

Programme course

6 credits

Bildbehandling och bildanalys

TNM087

Valid from: 2017 Spring semester

**Determined by**
Board of Studies for Computer Science
and Media Technology

**Date determined**
2017-01-25

## Main field of study
Media Technology and Engineering

## Course level
First cycle

## Advancement level
G2X

## Course offered for
- Media Technology and Engineering, M Sc in Engineering

## Entry requirements
Note: Admission requirements for non-programme students usually also include admission requirements for the programme and threshold requirements for progression within the programme, or corresponding.

## Prerequisites
Linear algebra, Calculus in several variables, Signals and systems, Matlab programming

## Intended learning outcomes
The aim of the course is to give the students a theoretical and practical basis for computerized processing and analysis of digital images. After the course the student shall be able to:

- describe the fundamental properties of the human visual system and the basic photometry concepts
- describe the structure and properties of cameras
- understand and use methods for generation of HDR images
- construct and use simple linear and non-linear filters in the spatial domain
- understand the connection between the spatial domain and the frequency domain
- describe the principles of image filtering in the frequency domain
- describe and implement simple methods for image segmentation
- understand and use morphological operations on binary images
- describe different methods for representation of objects in images
- describe the principles of pattern recognition based on decision functions

## Course content
The human visual system. Photometry. Image aquisition: camera properties, HDR images. Tone transformations. Filtering in the spatial domain. The Fourier transform, filtering in the frequency domain. Image restoration. Morphological operations. Segmentation. Representation of objects in images. Pattern recognition.

## Teaching and working methods
The course is given in the form of lectures and laboratory work.

## Examination

| | | | |
|---|---|---|---|
| LAB1 | Laboratory course | 1.5 credits | U, G |
| TEN1 | Written examination | 4.5 credits | U, 3, 4, 5 |

## Grades
Four-grade scale, LiU, U, 3, 4, 5

## Department
Institutionen för teknik och naturvetenskap

## Director of Studies or equivalent
Camilla Forsell

## Examiner
Reiner Lenz

## Course website and other links
http://www2.itn.liu.se/utbildning/kurs/

## Education components
Preliminary scheduled hours: 40 h
Recommended self-study hours: 120 h

# Course literature

## Additional literature

### Books

Gonzalez, Woods, (2008) *Digital Image Processing* Third edition Prentice Hall
Szeliski, (2010) *Computer vision : algorithms and applications* Springer

# Common rules

Regulations (apply to LiU in its entirety)

The university is a government agency whose operations are regulated by legislation and ordinances, which include the Higher Education Act and the Higher Education Ordinance. In addition to legislation and ordinances, operations are subject to several policy documents. The Linköping University rule book collects currently valid decisions of a regulatory nature taken by the university board, the vice-chancellor and faculty/department boards.

LiU's rule book for education at first-cycle and second-cycle levels is available at http://styrdokument.liu.se/Regelsamling/Innehall/Utbildning_pa_grund-_och_avancerad_niva.