# CM203V Introduction to Medical Image Analysis 2.0 credits

## Introduktion till medicinsk bildanalys

This is a translation of the Swedish, legally binding, course syllabus.

## Establishment

## Grading scale

A, B, C, D, E, FX, F

## Education cycle

Second cycle

## Main field of study

Medical Engineering

## Specific prerequisites

Bachelor's degree in Medical Technology, Engineering Physics, Electrical Engineering, Computer Science or equivalent. At least 6 credits in programming. English B/English 6.

## Language of instruction

The language of instruction is specified in the course offering information in the course catalogue.

## Intended learning outcomes

Image analysis is used to extract relevant information from images. Image analysis is important for the diagnosis and treatment of various diseases. The course covers concepts, theories, and the most used methods in image analysis. The course is focused on solving medically relevant problems.

After completing the course, the participant should be able to:

- Understand the main problems and challenges in image analysis
- Describe the main principles and methods and the main differences between them
- Summarize the advantages and disadvantages and scope of different methods
- Identify and understand the mathematical theory behind the most used methods
- Develop and systematically evaluate different methods for solving simplified problems
- Analyze the effect of different parameters of the methods in particular situations
- Explain the proposed strategy for solving specific problems

in order to:

- understand the complete workflow for using computational tools for image analysis in a medical context
- be able to implement computational solutions in image analysis to medically relevant problems
- have a broad knowledge base that can facilitate understanding literature in the field

## Course contents

- Feature extraction
- Image classification
- Image regression
- Machine learning and deep learning for image analysis

The course consists of lectures, laboratories, mathematical exercises, and an exam. Participants combine basic and advanced software libraries for image registration in Python, including scipy, numpy, SimpleITK, scikit-image, scikit-learn, TensorFlow, etc. The course also includes introductory labs for students with programming experience but no Python experience.

## Examination

- LAB1 - Laborations and exercises, 1.0 credits, grading scale: P, F
- TEN1 - Written exam, 1.0 credits, grading scale: A, B, C, D, E, FX, F

Based on recommendation from KTH's coordinator for disabilities, the examiner will decide how to adapt an examination for students with documented disability.

The examiner may apply another examination format when re-examining individual students.

If the course is discontinued, students may request to be examined during the following two academic years.

## Ethical approach

- All members of a group are responsible for the group's work.
- In any assessment, every student shall honestly disclose any help received and sources used.
- In an oral assessment, every student shall be able to present and answer questions about the entire assignment and solution.