

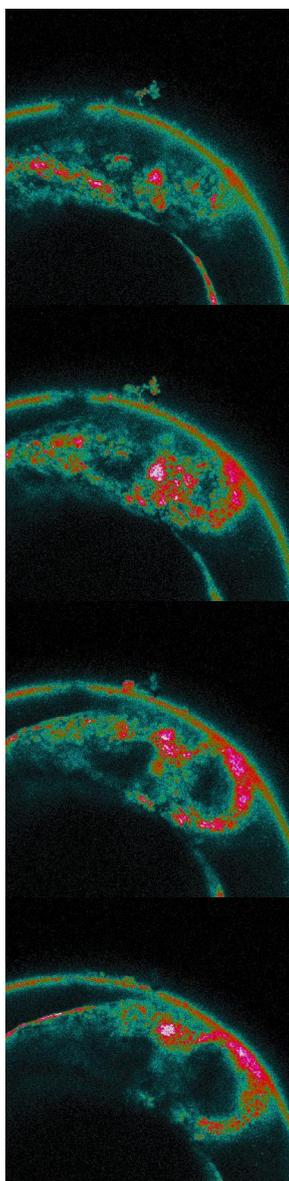
Title	Image Analysis in Microscopy
Credits	6 ECTS, Level 500
Master course	Bioinformatics, Computer Science, Data Science, Media Technology, Biology, Physics, Chemistry, LST, BPS
Prerequisite	Completed BSc
Language	English

Lecturer	Prof Dr Ir Fons J. Verbeek, LIACS, Imaging & Bioinformatics
Information	Prof Dr Ir F.J. Verbeek ( <a href="mailto:f.j.verbeek@liacs.leidenuniv.nl">f.j.verbeek@liacs.leidenuniv.nl</a> ), (071) - 527 5773
Course website	<a href="http://iammv.liacs.nl/">http://iammv.liacs.nl/</a> :
Schedule	2 <sup>nd</sup> semester, starting February 5 <sup>th</sup> – completing early June (practical)
Lectures	Tuesday 11.15 -13.00, Friday 13.00 – 14.45. Partially Online lectures. Lectures alternating with Practical of Schedule, practical Onsite.
Location	Leiden University Science Campus, Snellius Building, Room tba ( <a href="http://info.liacs.nl">http://info.liacs.nl</a> ), or as indicated on the website ( <a href="http://iammv.liacs.nl">http://iammv.liacs.nl</a> )

### Description

Image Analysis comes in many flavours as it is applied in many fields ranging from military and space programs to medical and biomedical research imaging. In this course we focus on analysis of images acquired through microscope modalities. The complexity of the scenes as well as the dimensionality provides a challenge and contributes to the understanding of the principles of image analysis in general. Consequently, the course is very much related to the practices in life-sciences research, examples and case studies are taken from the field of life-sciences research and occasionally from other sources.

Images play a major role in the understanding of biological processes. Bio-molecular processes are visualized by a range of microscope techniques and modalities. From images, coherent visualizations and models are derived. The characteristic sequence of image analysis starts with acquisition, proceeds with image restoration and segmentation to conclude with analysis. This sequence will be the backbone of this course. Image acquisition in microscopy will be dealt with on a theoretical as well as practical level. This is to understand physical limitations imposed by resolution. Therefore, physical principals are explained to become part of the thinking in images



The course is organised in a series of lectures in which all important aspects of imaging along the line of the characteristic sequence of image analysis are dealt with. Concepts of image processing will be introduced and it will be discussed how set of image features is compiled to a set of measurements. In the lecture subjects 2D imaging will be used as a means of explaining the principles. Subsequently, the switch is made to multi-dimensional imaging to illustrate the implications of imaging in research and connect to current topics in bio-medical research. Presenting results through visualization and modelling is an ingredient found in applications that are discussed. Therefore some aspects of visualization that are required for processing of results are addressed.

Next to the lectures, image processing workshops are offered and a number of practical assignments are given. Training in specific image analysis software environments is provided to solve the assignments. Practical "hands-on" experience with microscopes, i.e. image acquisition, is part of the course work and scheduled. Some of the images that are obtained from the microscopes are used in the assignments.

The course includes written 4 intermediate tests on the theory and a report on the practical work.