Faculty of Science

FYST29, Physics: Multi-spectral Imaging, 7.5 credits

Fysik: Multispektral avbildning, 7,5 högskolepoäng

Second Cycle / Avancerad nivå

Details of approval

The syllabus was approved by Study programmes board, Faculty of Science on 2008-12-10 to be valid from 2008-12-10, spring semester 2009.

General Information

The course is an elective course for second-cycle studies for a scientific candidate - or Master's degree in physics.

Language of instruction: English and Swedish
If needed, the course is given in English.

Main field of studies	*Depth of study relative to the degree requirements*
Physics	A1N, Second cycle, has only first-cycle course/s as entry requirements

Learning outcomes

The aim of the course is that students should have acquired the following knowledge and skills on completion of the course:

Knowledge and understanding

On completion of the course, the student should

- be able to describe how one for all fields common methodology can be used to extract physical and chemical information
- have basic knowledge of how spectroscopy can be used to characterise materials and phenomena

- have basic awareness of image analysis and multivariate methods

Skills and abilities

On completion of the course, the student should be able to

- assess which spectral region is most suited for different tasks
- assess which properties that are useful to characterise a display element
- work with image analysis tools
- present an implemented project in writing

Judgement and approach

On completion of the course, the student should

- be able to assess how multi-spectral imaging methods can be used to extract physical and chemical information from images registered in different wavelength bands

Course content

The course discusses how information about the physical and chemical nature of objects can be obtained through analysis of images registered in a number of appropriately chosen spectral bands The course teaches you how subobjects in an image can be identified through image processing using an appropriate contrast function. The technology has applications within medical diagnostics, industrial inspection, microscopy, criminology, environmental measurement technique, satellite based remote sensing and astronomy.
The course includes lectures in basic molecular physics and molecular spectroscopy, multi-spectral image formation and processing, image processing operations, orientation in multivariate analysis, detector system in the laboratory and in space. Several applications are treated including spaceborne remote sensing and astronomical image analysis. Experimental parts that are included are digital image registration and IR-thermography (thermo vision), multi-spectral imaging for medical diagnostics and environmental studies and image processing of data from the LANDSAT and the SPOT satellites. At the end of the course, a 1.5 credits project is included.

Course design

The teaching consists of lectures and supervision in connection with laboratory sessions and seminars. The lectures are mainly devoted to sections of the theoretical course. Discussions of research results, that is an important element in the course, are also done during the lectures. The experimental work is mainly laboratory sessions and preparatory discussions. All parts that belong to the laboratory work are compulsory and two students should submit a joint report.

Assessment

The examination is written. The written examination contains assignments, where understanding of the different principal parts of the course is emphasised. The examination covers the whole course at once. Normally, two examinations per academic year are given. Extra examinations can be given by agreement with course directors and director of studies. The project work is presented in writing.

Subcourses that are part of this course can be found in an appendix at the end of this document.

Grades

Marking scale: Fail, Pass, Pass with distinction.
To pass the entire course, approved examination, approved laboratory reports, passed project report and participation in all compulsory parts are required.

Entry requirements

For admission to the course, English B is required and knowledge equivalent to 90 credits physics.

Subcourses in FYST29, Physics: Multi-spectral Imaging

Applies from H08

0801 Multi-spectral Imaging, 7,5 hp
Grading scale: Fail, Pass, Pass with distinction