



# FSK3371 Neurophysiology of Vision 5.0 credits

Synens neurofysiologi

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

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

## Establishment

Course syllabus for FSK3371 valid from Autumn 2018

## Grading scale

## Education cycle

Third cycle

## Specific prerequisites

The student should have been accepted as a doctoral student.

## Language of instruction

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

## Intended learning outcomes

The overall goal of this course is to give the student a fundamental understanding of the neurophysiological function of the human visual system, focusing on its role in psychophysical

evaluation of vision.

After completing this course, the student should be able to:

- Describe the basic anatomy and physiology of the retina, the lateral geniculate nucleus, and the striate cortex (primary visual cortex, V1).
- Explain how light is transduced into a neural signal. Also explain how this signal is propagated through the retinogeniculate pathway by listing the function of the different cell types.
- Discuss the specificity of the visual system to stimulus spatial frequency and orientation in relation to receptive field profiles of ganglion and cortical cells.
- Relate the properties of the spatial as well as the temporal contrast sensitivity functions to the physiological processes in the visual system and predict their effect on other visual functions.
- Discuss the origin of spatial frequency channels and how they explain the usefulness of the contrast sensitivity function as well as adaption and aftereffect phenomena.

## Course contents

Basic anatomy of the retina, the lateral geniculate nucleus, and the striate cortex (primary visual cortex, V1). The physiological processes of photochemistry, transduction, and visual signal processing through photoreceptors, horizontal, bipolar, and ganglion cells. Receptive field profiles and selectivity of different cells to different stimulus properties such as spatial frequency, phase, orientation, and temporal movement. Spatial and temporal contrast sensitivity and visual acuity. Spatial frequency channels. Adaption. Aftereffects.

## Disposition

The students read the course literature and prepare oral presentation of chosen parts. All students and the examiner meet for the oral presentations.

## Course literature

R.L. De Valois and K.K. De Valois, Spatial Vision, Oxford University Press, 1990.

Other suitable literature:

Bradley C, Abrams J, Geisler WS. "Retina-V1 model of detectability across the visual field." *J Vis.* 2014 Oct 21;14(12).

## Examination

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.

## Other requirements for final grade

Oral presentation of the course literature.

## 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.