



**Karolinska  
Institutet**

Course syllabus for

## **Optics 2, 4.5 credits**

Optik 2, 4.5 hp

This course syllabus is valid from spring 2022.

Please note that the course syllabus is available in the following versions:

Spring2020 , Spring2022 , Autumn2022

Course code	1OP070
Course name	Optics 2
Credits	4.5 credits
Form of Education	Higher Education, study regulation 2007
Main field of study	Optometry
Level	G2 - First cycle 2
Grading scale	Pass with distinction, Pass, Fail
Department	Department of Clinical Neuroscience
Decided by	Utbildningsnämnden CNS
Decision date	2019-10-23
Revised by	Education committee CNS
Last revision	2021-09-29
Course syllabus valid from	Spring 2022

## **Specific entry requirements**

No specific entry requirements.

## **Objectives**

The course intends to give basic knowledge of diffraction and imaging errors in simple optical systems and in the eye and about how one describes image and visual quality that is necessary for continued optician education and work.

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

- discuss and analyse the resolution in aberration free optical systems.
- give an account of monochromatic and chromatic aberrations in optical systems
- assess reasonable demands on F-numbers and visual field of simple optical systems
- interpret and use information about image quality on the basis of the concepts of point spreading function and MTF
- account for and rank the different optical limitations of the eye
- interpret and evaluate measurement results from instruments measuring wavefront aberration of

- the eye
- explain and interpret information about visual quality based on the concepts, visual acuity and contrast sensitivity in the eye
- explain and use relations between image quality and vision quality in the eye

## Content

Optical errors Defocus and astigmatism monochromatic aberrations, wavefront aberration, zernike polynomials, the aberrations of the eye, chromatic aberrations, diffraction

Image and visual quality: dissolution, point spread function, MTF, visual acuity and contrast sensitivity, depth of field

## Teaching methods

The teaching is given in the form of lectures interleaved with calculation exercises and assisted problem solving where the theoretical knowledge is illustrated and practiced individually through calculation examples.

Demonstrations are compulsory, see heading "Examination".

## Examination

The course is examined in the following way:

- written examination, is graded U, G or VG
- compulsory demonstrations as per schedule

The course is graded U, G or VG.

The grade G requires G on written examination, and fulfillment of compulsory course elements. The grade VG requires VG on written examination, and fulfillment of compulsory course elements.

### *Absence from or unfulfillment of compulsory course element*

The examiner decides whether, and if so how, absence from or unfulfillment of compulsory course elements can be made up for. Study results cannot be reported until the student has participated in or fulfilled compulsory course elements, or compensated for any absence/ failure to fulfill in accordance with instructions from the examiner. Absence from or unfulfillment of a compulsory course element may imply that the student can not retake the element until the next time the course is offered.

### *Possibility of exception from the course syllabus' regulations on examination*

If there are special grounds, or a need for adaptation for a student with a disability, the examiner may decide to deviate from the syllabus's regulations on the examination form, the number of examination opportunities, the possibility of supplementation or exemptions from the compulsory section/s of the course etc. Content and learning outcomes as well as the level of expected knowledge, skills and attitudes may not be changed, removed or reduced.

## Transitional provisions

If the course is cancelled or goes through substantial changes, information about interim regulations will be stated here.

## Other directives

Course evaluation takes place according to guidelines established by Karolinska Institutet.

The course is given in collaboration with the Department of applied physiology at KTH. The course may be given in parallel with the course Basic Optometry 2.

Some teaching may be in English.

## Literature and other teaching aids

### *Mandatory literature*

Mandatory compendiums are distributed free of charge

*Unsbo, Peter*

#### **Kurskompendium i geometrisk och fysikalisk optik**

Institutionen för tillämpad fysik, KTH,

*Unsbo, Peter; Lundström, Linda*

#### **Kurskompendium i avbildningskvalitet och synkvalitet**

Institutionen för tillämpad fysik, KTH,

### *Recommended literature*

*Freeman, Michael Harold*

#### **Optics**

*Hull, C. C.; Charman, W. N.*

11. ed. : Oxford : Butterworth-Heinemann, 2003 - 563 s.

ISBN:0-7506-4248-3 LIBRIS-ID:8917891

[Library search](#)

*Rabbetts, R. B.*

#### **Clinical Visual Optics**

4:e upplaga : Oxford: Butterworths - 488s. : 2007

ISBN:0-7506-8874-2

[Library search](#)