Course syllabus for

Signal Theory, 6 credits

Signalteori, 6 hp
This course syllabus is valid from autumn 2017.
Please note that the course syllabus is available in the following versions:
Autumn2017 , Autumn2018 , Autumn2019 , Autumn2020 , Autumn2022 , Autumn2023

Course code	1AU058
Course name	Signal Theory
Credits	6 credits
Form of Education	Higher Education, study regulation 2007
Main field of study	Not applicable
Level	GX - First cycle
Grading scale	Fail (U) or pass (G)
Department	Department of Clinical Science, Intervention and Technology
Decided by	Education committee CLINTEC
Decision date	2017-04-27
Course syllabus valid from	Autumn 2017

Specific entry requirements

Specific eligibility according to The Programme syllabus of The Study Programme in Audiology 180 credits.

Objectives

The general aim of the course is to give the student basic knowledge of signals and systems, and an understanding of audiological applications of signal theory.

Learning outcomes of the course

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

- describe signals' properties i time and frequency and explain the relationship between these descriptions
- apply knowledge on how the energy distribution for broadband signals are calculated, relate this to the signal process properties of systems
- account for the bases in digital signal processing, and be able to describe the properties of linear and non-linear systems, relate these to hearing aids, and the sense of hear as signal process system, apply this knowledge
- analyse recorded sound by means of the fundamental concepts of signal theory

Content

The following parts are included:

Basic signal theory, 2 hp This part gives basic knowledge of the representation of simple and complex signals in the time and frequency domains and about relations between the representations. The terminology from the basic physics education is extended. The concept of band is treated, including arithmetical rules for band level summation. The basic characteristics of digital signals are discussed.
Signals and Systems, 4 hp This part deals with the affect of systems on signals. Simple ideal systems such as filters are treated as well as real systems, both acoustic and electric. The ear is also brought up as an example of a system. Focus is on linear systems. Undesired non-linearity is treated, such as various types of distortion. The hearing aid as a signal processing system is introduced and, in connection with that, undesired non-linearity is discussed. An orientation is given, how to investigate the characteristics of different systems.

Teaching methods

Lectures, seminars and calculation exercises are interleaved with independent theoretical work and practically orientated laboratory sessions. Laborations and seminars are compulsory. Scheduled supervision is offered in connection to the laboratory sessions.

In case of absence from compulsory part, the student is responsible for contacting course director for complementary assignment.

The course director assesses how absence from compulsory education elements can be replaced. Before the student has participated in the compulsory parts or has replaced compulsory education, in accordance to the instructions of the course director, the final study results cannot be reported.

Absence from a compulsory education element may lead that the student can not recover the occasion until next time the course is given.

Examination

Examination takes place through
Part 1: Basic signal theory, 2 HE credits
Written assignment

Part 2: Signals and Systems, 4 HE credits
Written laboratory report
Written assignments
Oral presentation

For a Pass grade in the course, attendance and active participation in compulsory parts are also required. Students who do not pass a regular examination are entitled to re-sit the examination on five more occasions. Each time the course is offered, one regular examination and two additional examinations are given. Each occasion the student participates in the same test counts as an examination. Supplementary qualification of written assignment is counted as an examination. In case a student is registered for an examination but does not attend, this is not regarded as an examination.

Transitional provisions

Examination can take place according to an earlier literature list during a time of one year after the date when a renewal of the literature list has been made. Examination will be provided during a time of two years after a possible close-down of the course.

Other directives

Assessment criteria for examination, specific instructions for certain tasks and timetable with specification of compulsory parts and list of responsible teachers may be found on Pingpong on the first day of the course.

Course evaluation will be carried out in accordance with the guidelines established by the Board of Education. Course evaluation is carried out both through a written evaluation at the end of the course, and through an oral forum at least once in connection with the course, where the students may express their opinions.

Literature and other teaching aids

Rosen, Stuart.; Howell, Peter

Signals and systems for speech and hearing

2. ed. : Bingley : Emerald, 2011 - xvii, 364 p.
ISBN:978-1-84855-226-5 (hbk.) LIBRIS-ID:12037068
Library search

Emanuel, Diana C.; Letowski, Tomasz

Hearing science

Philadelphia : Wolters Kluwer Health/Lippincott Williams and Wilkins, c2009 - xv, 335 p.
ISBN:9780781780476 LIBRIS-ID:10724924
Library search

Scientific articles and other materials may be added.

Speaks, Charles E

Introduction to sound : acoustics for the hearing and speech sciences

3. ed. : San Diego : Singular Pub. Group, c1999 - xiii, 316 p.
ISBN:1-56593-979-4 LIBRIS-ID:6364449
Chapter 5 to 7 contains an alternative representation of large parts of the course.
Library search

Smith, Steven W.

The scientist and engineer's guide to digital signal processing

San Diego, Calif. : California Technical Publ., cop. 1997 - xiv, 626 s.
ISBN:0-9660176-3-3 LIBRIS-ID:7123439
Library search