Digital Signal Processing

Course description 2012

The course Digital Signal Processing is given for students at Lund University. The course is compulsory for students in Electrical Engineering, Computer Science and Information and Communications. This instance of the course is given in Hangzhou, China, at Zhejiang University, for students from Lund University and Zhejiang University.

Credits: 7.5 ECTS credits (60 credits corresponds to one year full time studies).
Recommended prerequisites: Calculus in one variable.
Assessments: Laboratory work, homeworks and written exam.
Course coordinator: Bengt Mandersson (bm@eit.lth.se)
Teachers: Benny Lövström (benny lovstrom@bth.se) and Jiandan Chen (chenjiandan@gmail.com)

Introduction

Welcome to the course in Digital Signal Processing. The course will be held by Benny Lövström and Jiandan Chen. The course was given first time during autumn 2009 for the students following the China line at LTH, Lund University.

Schedule 2012:
Lectures: 20 h. Problem solving sessions: 20 h. Laboratory work including home works: 14 h.

Aim

We use daily equipments in which the signals are stored and treated digitally. From the basic signal processing used in CD-players to advanced processing used in MP3 coding of music, speech coding in GSM, digital video and image processing. The course gives the basic knowledge in digital signal processing and knowledge of signal properties in the time domain as well as in the frequency domain. The course presents the fundamentals on digital signal processing such as Fourier transform of analogous signals, Fourier transform of discrete time signals, the discrete Fourier transform (DFT), z-transform and input-output relations.

Contents

The course deals with time discrete signals and systems. Items such as the Fourier Transform, the Discrete Fourier Transform (DFT) and the z-transformed are treated in the course as well as some basic structures for implementation of digital filters. Also, system function and frequency functions are introduced as well as digital filters. Digital processing of analogous signals using A/D and D/A conversion is studied. In the laboratory work, practical applications of digital signal processing such as speech signal processing and biomedical signals processing are treated. Also, basic filter design using MATLAB and digital signal processors (DSP) are covered in the course.

Literature

- Examples, solutions and laboratory work from the department.
- Formulas and tables.
• Copy of slides from the lessons will be distributed during the course.
• Extra material which can be downloaded from the homepage.


**Information during the course**

Benny Lövström (Sept 9-30) and Jiandan Chen (Oct 7-26). We can be contacted by the email addresses given on previous side, or by phone (+86)15267139743.

**Lectures and problem solving sessions**

Ten lectures and ten problem solving sessions are included in the course 2012. The schedule for the lectures and problem solving sessions will be distributed on the homepage.

**Laboratory work**

The laboratory work is compulsory. Two laboratory work and two preparation excercises are included in the course.

Equipment: PC computers + microphones and headphones.
Software: MATLAB (or similar program)

**Home work assignments**

Two home works are included in the course and these are compulsory. The aim of the homework is to
• get a continuous learning process.
• give feedback to the students.

All problems in the homework's must be solved individually but the students may ask the teachers for help if they get any problems. The homework's will be returned with comments and perhaps corrections. Then you have to add the corrections to your solutions.

**Problem solving sessions**

The problems are mainly from the textbook and problems with solutions will be distributed to the students.

**Examination**

The examination consists of a final exam combined with homework during the course. The homework's are compulsory and passed homework's g extra marks (max 1 mark) which will be added to the result from the final exam (valid for one year). The final exam consists of 5 problems. Each problem will give maximum 1 mark. Limits 0-2.9 not passed, 3.0-3.9 gives grade 3, 4.0-4.9 gives grade 4, >5.0 gives grade 5. To pass the course, you must pass the final exam and fulfill the laboratory works including the homework.