ELEC9721

Digital Signal Processing Theory and Application

COURSE INTRODUCTION-Session 2, 2009

Course Staff

Course convener: A/Prof. Tuan D. Hoang, Room 206, EE Building; Email: h.d.tuan@unsw.edu.au

Consultations

Students are encouraged to use the open consultation hour rather than contact by email; students may seek consultation with the course convener at other times by appointment.

Course details

Credits: The course is 6 Units of Credit;

Contact hours: The course consists of 3 hours of lectures per week, which also include the tutorials.
Lectures: Wednesday, 6pm-9pm, room EE224
Check the website http://subjects.ee.unsw.edu.au/elec9721/ for updated schedule.

Course Details

Context and aims

The course aims to give students the fundamental of signal processing as well as exploring some important and illustrative applications in digital circuits and digital communication. We will start by defining and understanding signals which will enable us to see the need and aims of processing them. We will then study a number of signal processing tools and the mathematical concepts they are based on. We also study some important applications in order to elucidate the concepts learned. Topics to be covered in the course are following: digital signals; digital filter design; statistical and adaptive signal processing; Bayes estimations; Applications in digital circuits and digital communication.

Assumed knowledge: In undertaking this course, a very elementary knowledge of linear algebra and also MATLAB programming is highly desirable and will facilitate the handling of the introduced concepts by students

Learning outcomes

After the successful completion of the course, the student should have an appreciation of the fundamentals of Digital Signal Processing as well as knowledge of some of its important applications. The students should then be familiar with signals and transforms,
filters, random variables and elementary statistical signal processing, digital communication channels estimation and OFDM (orthogonal-frequency-division-multiplexing) among other topics.

**Teaching strategies**

The course consists of the following elements: lectures (first 2 hours of the lectures), tutorials (last hour of the lectures), and assignments. At the beginning of each lecture and tutorials, the copies of their contents will be distributed to students. All of them will be posted on the website at the end of the session.

**Lectures**

The lectures provide the students with explanation of the core material in the course. Numerous examples of analysis and design of digital signal systems are discussed in order to convey their qualitative understanding. Students are expected to attend the lectures and prepare themselves for them.

**Tutorials**

The tutorials enable students to understand some technical details and concrete problem solutions orientated approaches in the course. Students are expected to attend the tutorials and are expected to attempt to solve given tutorial questions before attending the tutorial.

**Assessment**

- Final examination (65%) - The final examination is a standard open-book three hours written examination. The examination will test knowledge and understanding of all major aspects covered in the course.

- Two assignments: the first assignment (20%) is at the last week before the break and the second assignment (15%) is at the last week of the session.

1 **Course Schedule**

**W0:** Orientation and Background  
**W1:** Linear Algebra Foundations of Signal processing  
**W2:** Systems and Signals in frequency domain  
**W3:** Digital Filters and Structures  
**W4:** Digital Filter Design  
**W5:** Fast Fourier Transforms  
**W6:** Random Process and elementary statistical foundation  
**W7:** Spectrum Estimation  
**W8:** Bayes Estimation and Signal Recovery  
**W9:** Adaptive Filtering  
**W10:** Digital Communication and OFDM  
**W11:** Revision
Textbooks
