School of Electrical Engineering & Telecommunications

Faculty of Engineering

ELEC 9721

Digital Signal Processing Theory and Applications

Summer Session 2014/2015

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Course Staff
Course convener: Dr. Phu Le, (phule@unsw.edu.au)

Lecturer: Dr. Phu Le, (phule@unsw.edu.au)

Consultations: You are encouraged to ask questions after the lecture/lab or you can contact me by email (phule@unsw.edu.au).

Course details
Credits: The course is a 6 UoC course; expected workload is 11-12 hours per week throughout the 8 week session.

Contact hours: The course consists of 6 hours of per week, comprising lectures and/or laboratory (a typical class might be 2 hours of lecture followed by 1 hour of lab).

Lectures: Mondays and Thursdays 6:00–9:00 pm, room EE214 (See the timetable at the end of this course outline).

Course Information
Context and aims

ELEC9721 Digital Signal Processing and Applications, is a 6 UoC post-graduate course that aims to give students the fundamentals of digital signal processing as well as exploring some important and illustrative applications. The course starts by defining and understanding signals that will enable us to see the need and aims of processing them. It will then investigate a number of signal processing tools and the mathematical concepts they are based on. Finally, some applications in order to elucidate the concepts are learned. Topics from the following list will be covered: digital signals and systems; digital filter design; statistical and adaptive signal processing; multi-rate systems and filterbanks; time-frequency analysis (includes wavelets); DSP applications.

Pre-requisites: Although the course has no formal pre-requisites, strong knowledge of linear algebra and experience in MATLAB is necessary.

Learning outcomes

Upon successfully completing the course, students should have an understanding of Digital Signal Processing, as well as knowledge of some of its applications. Students will also understand signals and transforms, filters, random variables and statistical signal processing, and time-frequency analysis among other topics.

The course delivery methods and course content address a number of core UNSW *graduate attributes*:

a. The capacity for analytical and critical thinking and for creative problem-solving, which is addressed by the tutorial exercises and laboratory work.

b. The ability to engage in independent and reflective learning, which is addressed by tutorial exercises together with self-directed study.

c. The skills of effective communication, which are addressed by the viva-style verbal assessment in the laboratory.

d. Information literacy, which is addressed by the assignments and project.

Teaching strategies

The course consists of the following elements: lectures, laboratory work, and tutorial questions.

The lectures are the primary mode of teaching. Laboratory work is sometimes combined with analytical work as a form of assignment. The laboratories will be assessed regularly. Pre-preparation for laboratory work is essential, particularly for any analytical work corresponding to the laboratory. Tutorials also will be given regularly, which aim to provide in-depth quantitative and qualitative understanding of DSP concepts.

Laboratory classes will start from the first day with the compulsory Introductory MATLAB laboratory. You will need to bring to the laboratories:

- A USB drive for storing MATLAB script files

- Your lecture notes, laboratory preparation and/or any other relevant course materials

Together with your attendance at classes, your self-directed reading, completion of problems from the problem sheet and reflection on course materials will all form the basis of your understanding of this course.

Assessment

Laboratory: 25%
Mid-session exam: 15%
Final examination: 60%

Laboratory work (25%): The laboratory work will be assessed in certain labs. The laboratory assessment is conducted during the lab sessions, so it is essential that you arrive at each lab having revised lecture materials (and attempted problems from the problem sheet) in advance of each laboratory, and having completed any requested preparation for the labs. Without preparation, marks above 50% may be difficult to obtain. No lab reports are required in this course.

Note that *laboratory assessment will be conducted individually, not on a per-group basis*. Please also note that *you must pass the laboratory component in order to pass the course*.

Mid-session examination (15%): The mid-session examination tests your general understanding of the course material, and questions may be drawn from any course material up to the end of week 4.

Final examination (60%): The exam in this course is a standard closed-book 3 hours written examination. The examination tests analytical and critical thinking and a thorough understanding of the course material in a controlled fashion. Please note that ***you must pass the final exam in order to pass the course***. University approved calculators are allowed.

Course schedule

Date	Time	Class	Time	Class
Monday, 1-Dec-14	6:00-8:00 pm	Lecture/Tutorial	8:00-9:00 pm	Lab
Thursday, 4-Dec-14	6:00-8:00 pm	Lecture/Tutorial	8:00-9:00 pm	Lab
Monday, 8-Dec-14	6:00-8:00 pm	Lecture/Tutorial	8:00-9:00 pm	Lab
Thursday, 11-Dec-14	6:00-8:00 pm	Lecture/Tutorial	8:00-9:00 pm	Lab
Monday, 15-Dec-14	6:00-8:00 pm	Lecture/Tutorial	8:00-9:00 pm	Lab
Thursday, 18-Dec-14	6:00-8:00 pm	Lecture/Tutorial	8:00-9:00 pm	Lab
Monday, 5-Jan-15	6:00-8:00 pm	Lecture/Tutorial	8:00-9:00 pm	Lab
Thursday, 8-Jan-15	6:00-8:00 pm	Lecture/Tutorial	8:00-9:00 pm	Lab
Monday, 12-Jan-15	6:00-8:00 pm	Lecture/Tutorial	8:00-9:00 pm	Lab
Thursday, 15-Jan-15	6:00-8:00 pm	**Mid session exam**	8:00-9:00 pm	Lab
Monday, 19-Jan-15	6:00-8:00 pm	Lecture/Tutorial	8:00-9:00 pm	Lab
Thursday, 22-Jan-15	6:00-8:00 pm	Lecture/Tutorial	8:00-9:00 pm	Lab
Monday, 29-Jan-15	6:00-8:00 pm	Lecture/Tutorial	8:00-9:00 pm	Lab

All the lecture/tutorial will be at EE224 and the lab will be at G16.