TE WHARE WĀNANGA O TE ŪPOKO O TE IKA A MĀUI VICTORIA UNIVERSITY OF WELLINGTON

SCHOOL OF ENGINEERING AND COMPUTER SCIENCE

Advanced Signal Processing - Course Outline

ECEN 421: 2012 Trimester 1

This document sets out the workload and assessment requirements for ECEN 421. It also provides contact information for staff involved in the course. If the contents of this document are altered during the course, you will be advised of the change by an announcement in lectures and/or on the course web site. A printed copy of this document is held in the School Office.

Objectives (and associated graduate attributes)

By the end of the course, students will be able to:

1. Understand stochastic processes and their properties, and be able to derive and apply the Wiener filter 3(a) , 3(b)
2. Understand time series, ARMA models and estimation methods based on AR models 3(a) , 3(e) .
3. Understand the concept of estimation, and be able to derive the maximum likelihood estimator for a variety of problems 3(b) ,3(e) .
4. Understand and apply the concept of Bayesian estimation 3(a) ,3(e) .

Textbook

There is no single text for ECEN 421. However, these books are recommended reading:

1. C.W. Therrien, Discrete Random Signals and Statistical Signal Processing, Prentice Hall, 1992
2. S.M. Kay, Fundamentals of Statistical Signal Processing, Estimation Theory, Prentice hall, 1993

Course Content

The following is an outline of the topics covered in the lectures.

- Introduction to Random Variables, Stochastic Processes and Moments.
- Correlation functions
- Stochastic processes and systems
- The Wiener filter
- The Matched Filter
- Time series, ARMA processes
- Spectrum estimation using AR processes, Yule-walker equations
- Subspace methods, MUSIC.
- Maximum likelihood estimation
- Cramer Rao bounds
- Introduction to Bayesian Estimation

Lectures, Tutorials, Laboratories, and Practical work

A schedule of lecture topics, readings, and assignment due dates is available online

Lectures for ECEN 421 are: Monday, Wednesday and Friday at 4:10 pm in AMLT105

Labs for ECEN 421 are: Wednesday 12:00pm-3:00 pm in CO249.

Assignments

There are 12 written assignments, each due on Tuesday, except the last which is due on the last Friday.

Workload

In order to maintain satisfactory progress in ECEN 421, you should plan to spend an average of at least 10 per week on this paper. A plausible and approximate breakdown for these hours would be:

- Lectures and tutorials: 3 hours/week
- Laboratories: 3 hours/week
- Readings: 1 hours/week
- Assignments: 3 hours/week

School of Engineering and Computer Science

The School office is located on level three of the Cotton Building (Cotton 358).

Staff

The course organiser for ECEN 421 is Paul Teal. The lecturers for the course are Paul Teal and Bastiaan Kleijn. Their contact details are:

- Paul Teal
- McDiarmid 228
- +64 4 463 5966
- paul.teal@vuw etc

- Bastiaan Kleijn
- McDiarmid 226
- +64 4 463 5045
- bastiaan.kleijn@ecs.vuw etc

Announcements and Communication

The main means of communication outside of lectures will be the ECEN 421 web area at http://ecs.victoria.ac.nz/Courses/ECEN421_2012T1/. There you will find, among other things, this document, and the lecture schedule.

Assessment

Your grade for ECEN 421 will be determined based on the following assessment weightings:

Item	Weight
12 written assignments	30%
4 laboratory sessions	10%
Final Examination (3 hours)	60%

Bachelor of Engineering students should be aware that copies of their assessed work may be retained for inspection by an IPENZ appointed accreditation panel.

Policies and penalties for late submission

The laboratory assignments will be Matlab based. The printed results of a Matlab ``publish" of a file constructed during each laboratory session is to be handed in no later than one week following the laboratory session. Assignments and labs not collected in lectures can be collected from the SECS school office. Matlab files implementing the work of each laboratory session should be submitted no later than 1 week after the lab. Late submission of lab work incurs a penalty of 10% per working day.

The best 10 marks for the 12 written assignments will be counted to the 30% for the assignments. Because of the rapid turnaround of these small assignments, late submissions will not be accepted.

Tests and Exams

The timetable for final examinations will be available from the University web site and will be posted on a notice board outside the faculty office. The final examination will be three hours long. No computers, electronic calculators or similar device will be allowed in the final examination. Paper non-English to English dictionaries will be permitted. The examination period for trimester 1 is 15 June - 4 July.

Plagiarism

Working Together and Plagiarism

We encourage you to discuss the principles of the course and assignments with other students, to help and seek help with programming details, problems involving the lab machines. However, any work you hand in must be your own work.

The School policy on Plagiarism (claiming other people's work as your own) is available from the course home page. Please read it. We will penalise anyone we find plagiarising, whether from students currently doing the course, or from other sources. Students who knowingly allow other students to copy their work may also be penalised. If you have had help from someone else (other than a tutor), it is always safe to state the help that you got. For example, if you had help from someone else in writing a component of your code, it is not plagiarism as long as you state (eg, as a comment in the code) who helped you in writing the method.

Mandatory Requirements

1. Attendance at 85% of lectures
2. Submission of a reasonabe attempt of 80% of assignments
3. Submission of a reasonabe attempt of 80% of laboratories

Passing ECEN 421

To pass ECEN 421, a student must satisfy mandatory requirements and gain at least a **C** grade overall.

Withdrawal

The last date for withdrawal from ECEN 421 with entitlement to a refund of tuition fees is Friday 16 March 2012. The last date for withdrawal without being regarded as having failed the course is Friday 18 May 2012 -- though later withdrawals may be approved by the Dean in special circumstances.

Rules & Policies

Find key dates, explanations of grades and other useful information at http://www.victoria.ac.nz/home/study.

Find out about academic progress and restricted enrolment at http://www.victoria.ac.nz/home/study/academic-progress.

The University's statutes and policies are available at http://www.victoria.ac.nz/home/about/policy, except qualification statutes, which are available via the Calendar webpage at http://www.victoria.ac.nz/home/study/calendar (See Section C).

Further information about the University's academic processes can be found on the website of the Assistant Vice-Chancellor (Academic) at http://www.victoria.ac.nz/home/about/avcacademic

All students are expected to be familiar with the following regulations and policies, which are available from the school web site:

Grievances
Student and Staff Conduct
Meeting the Needs of Students with Disabilities
Student Support
Academic Integrity and Plagiarism
Dates and Deadlines including Withdrawal dates
School Laboratory Hours and Rules
Printing Allocations
Expectations of Students in ECS courses

The School of Engineering and Computer Science strives to anticipate all problems associated with its courses, laboratories and equipment. We hope you will find that your courses meet your expectations of a quality learning experience.

If you think we have overlooked something or would like to make a suggestion feel free to talk to your course organiser or lecturer.