

Thursday, January 02, 2003

MULTIDIMENSIONAL SIGNAL PROCESSING

COURSE INFORMATION

L. T. Bruton

The Calendar description of the course is available in the Calendar and at the course web page:

<http://www-mddsp.enel.ucalgary.ca/People/bruton/Enel699Main.html>

The purposes of the course are to provide an introduction to the basic theory of multidimensional (MD) signal processing, to study some applications and to review some of the pertinent literature.

Prerequisite Knowledge: Students are expected to have a good undergraduate-level understanding of one-dimensional (1D) analog and digital signal processing and especially with the theory and design of 1D digital filters. Students should also be able to program signal processing algorithms and make 2D/3D graphs in Matlab or another equivalent computer language.

The final course mark will be determined on the following basis:

Final Examination:	40 %
Individual Quizzes and Written Assignments:	35 %
Individual Final Report: Oral and Written:	25 %

The Final Examination is closed-book, although students will be permitted to bring into the Final Examination up to two sheets of paper (two pages, 11.5 in. x 8.0 in. in size) containing their personal notes relating to the course. The examination will be held on the last day of lectures.

The Individual Quizzes and Written Assignments are assigned at appropriate intervals during the course: some of may be in class quizzes and others may be take-home assignments.

The Individual Final Report is an extensive review of relevant literature in an assigned area of study and is based on Reading Assignments. Assessment of the Final report is based on the overall quality of the associated Oral Presentation as well as the Written Report.

Background reading may be especially important for students who wish to review the fundamentals of one-dimensional (1D) signal processing. *There will be a written test, early in the course, of some of the required background knowledge of 1D signal processing.*

READING MATERIAL: TEXTBOOKS

There is no *required* course textbook.

Review of 1D Signal Processing

- [1] *Digital Filters, Analysis, Design and Applications*, A. Antoniou, Second Edition, McGraw-Hill
- [2] *Enel 593 Digital Filtering Learning Units*, L. Bruton, University of Calgary, 2000.
(Available from the course web page at
<http://www-mddsp.enel.ucalgary.ca/People/bruton/Enel699Main.html>).

MD Signal Processing

- [3] *Enel 699 Course Notes, Chapter 1 to 8*, L. Bruton, University of Calgary, 2001.
(Available from the course web page at
<http://www-mddsp.enel.ucalgary.ca/People/bruton/Enel699Main.html>).
- [4] *One- and Multidimensional Signal Processing*, H. Schroder, H. Blume, Wiley, 2000
- [5] *Multidimensional Digital Signal Processing*, D.E. Dudgeon and R.M. Mersereau
Prentice-Hall. 1984.
- [6] *Two-Dimensional Signal and Image Processing*, J.S.Lim, Prentice-Hall, 1990.

Image Processing

- [7] *Fundamentals Of Digital Image Processing*, A.K.Jain, Prentice-Hall, 1989.

Review of Basic Mathematics and 1D Systems Theory

- [4] *Linear Algebra and its Applications*, G. Strang, Academic Press 1976.

- [5] *Linear Systems and Signals*, B.P. Lathi, Berkeley-Cambridge, 1992.

MATLAB SOFTWARE

The signal processing software package Matlab, by Mathworks Inc., is available in the department. Whenever possible, students are requested to use Matlab programs for their submitted course work. Students should be familiar with functions in the Matlab Signal Processing Toolbox and with the 2D and 3D graphics functions.