UNIVERSITY OF WISCONSIN - MADISON
Computer Sciences Department

General Information
CS515, Spring 08

January 22, 2008

General Information

Course Name:

Introduction to Splines and Wavelets

Lectures:

Time:	TR 12:50–2:15 (note the power lecture)
Place:	1207 CS

Instructor:

Name:	Amos Ron
Office:	CS 7381
Phone:	262-6621
E-mail:	`amos@cs.wisc.edu`
Office Hours:	T 2:30–3:30 F 5-6

TAs:

Name:	Tzu-Han Chou
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Phone:	262-5105
E-mail:	`tchou2@wisc.edu`
Office Hours:	M 13–14, W 10–11.

Text Book

None. We will use lectures notes. A link to the lecture notes is found at our website.

Students may consider getting the book: *Wavelets and Filter banks*, by Strang and Nguyen, Wellesley-Cambridge Press, 1997. Reading material about splines will be made available during the semester. The book *Practical Guide to Splines* by Carl de Boor is excellent, but may be over the head for many students. Students unfamiliar with MATLAB may download the `Matlab` primer from our site (do not print it, use it on-line).

Introduction

The goal of this course is to provide graduate students and advanced undergraduate students with an introduction to the mathematics and practice of Data Representation. The focus of this course will be on wavelet decompositions and spline representation, partly because of the prominence of these topics in Data Representation, and partly because these are the specialty topics of the instructor.

Syllabus:

Wavelets: Introduction to Fourier series and Fourier transform; time-frequency localization; wavelets and frames (analysis and synthesis, orthogonal wavelets, biorthogonal wavelets, tight frames); applications: denoising and compression of signals and images.

Splines: Interpolation and approximation by splines (interpolation, least-squares approximation, smoothing, quasi-interpolation and other local methods; splines as linear combinations of B-splines; knot insertion and subdivision; free-knot spline approximation; splines in CAGD).

Programming

The only language for this course is `Matlab`, and a brief introduction to `Matlab` is a part of this course.

Machine

Student accounts will be accessible from any CS Unix machine. Activate your account (by using the 'newuser' procedure; the instructions are found in the user rooms) ASAP, and familiarize yourself with the operating system, and with an editor of your choice. Your account is already active (with the same `login` and `passwd`) if you are a CS major and/or you took a CS class last semester. The operating system is, essentially, *Unix*. You may purchase the CS 1000 handout at the DoIT Tech Store for info on Unix. Unix orientation sessions are in room 1325 at the

W	Jan 23	4:00	pm	room	1325	CS
T	Jan 24	4:00	pm	room	1325	CS
M	Jan 28	4:00	pm	room	1325	CS

In addition, you will need to use some editor. The editor vi is a possibility. A sophisticated intro to `vi` is already available from the web page for the class (see below).

Grading Policy

One midterm (30%), a wavelet project (30%), short assignments (15%), one final (30

Class page and class list

All info about this course (assignments, samples of exams, etc) should be obtained from the web page
`http://www.cs.wisc.edu/~amos/cs515.html`
Many handouts are in `postscript`. In order to read a postscript file, either send it to a printer that supports `postscript` (e.g., all the printers in the CS Department), or type
`gv <filename>`
to view it on-line.

Grades will be available at the *desire to learn* website `http://www.doit.wisc.edu/faculty/elearning/cms/`
Sending an e-mail message to
`cs515-1list@cs.wisc.edu`
(as the instructor is likely to do) will send that message to the entire class, including the instructor and TAs. Thus, if you do not plan on using your CS account, you must forward your mail to whatever location you plan to use. Check your mail frequently (every day, if possible). All email sent to the class list is archived, and available via the class web page.

Interaction among students

Discussing matters related to our class with other students is an excellent way to reenforce learning and get a better grasp of the material; this includes learning the material in groups, going over review problems together, etc. In contrast, any disclosure of any part of your written assignment/project, and/or any part of your code, to another student taking this class is considered a fraudulent activity, and the beneficiary of such activity benefits at the expense of the other students in class. Please report to the instructor any case of this nature that you become aware of; your name, then, will not be disclosed to others without your permission.