Math 5467, Spring 2003 **Syllabus** early version

COURSE
Introduction to the Mathematics of Wavelets meets 3 times weekly at 12:20 - 1:10pm MWF, VinH 301.

INSTRUCTOR
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Office Hours: 1:30-2:30pm, MWF, and by appointment.

TEXT (ISBN 0-521-57894-9 paperback)
A Mathematical Introduction to Wavelets, by P. Wojtaszczyk, Cambridge University Press, 1997.

MATERIAL COVERED
This course, Introduction to the Mathematics of Wavelets, covers Wavelets (via Multiresolution Analysis) and background, including but not limited to Hilbert Space, Fourier Transforms and (lightly!) Fourier Series, and the Fast Fourier Transform. The text has a lot more in it than we need, and in turn it needs a great deal of background information, which will be placed on the Web from time to time, as PDF documents. Several of these documents will be posted early. We will cover material from Chapters 1, 2, 4 and 5, mainly, with material drawn from other sources for Hilbert Space, Fourier Transforms, Fourier Series, and the Fast Fourier Transform. A little bit from Chapters 3 and 9, perhaps 7, may interest us. Chapters 6 and 8 are of interest in (mathematical) Harmonic Analysis and Functional Analysis. We will also need to study some fast algorithms used in applications of wavelets.

It is very important that you be able to *use* certain tools that come out of the theory of the Lebesgue integral, even though I only expect your background to to include only the Riemann Integral (the integral of elementary Calculus courses). The reasons *why* the tools (Theorems) are true are pretty much irrelevant to learning about wavelets. But if you have worries about particular points, I'd very much enjoy talking with you about them!

GRADING
You'll have Homework, 2 Midterm Exams tentatively scheduled for two Fridays: **February 21 and April 4.** There will be a **Final Exam,** that may be a Take–Home Final if the class chooses that option unanimously. Homework will consist of problems to be scored by a papergrader and up to three Projects to be scored by me.

Calculators will not be allowed on Tests or on the Final.

Each Test may involve material covered in lectures up to the Test! Thus, *you are responsible for material covered in the lectures!*

There will be one to three Projects, that may (except for the first) be done by teams. The first Project will be fairly routine – to get you familiar with the writing of technical reports. Project scoring will definitely be competitive!

Your grade in this course will reflect what you did in it, not your ability or potential. It is very important, then, for you to be able to put your work on paper, under time pressure. If you have problems taking tests, there are people on campus who might be able to help you overcome them. Ask about it at an office hour!

You'll have a GPA grade for each Test, your Homework, each Project, and the Final. The weighting of the grades, though subject to change, is, at present: 19% for each Test, 24% for your Discussion Section, 5% for the Project and 33% for the Final. Grades will perhaps amount to 80–85% for A, 65–70% for B, 50–55% for C, 40–45% for D.

How to calculate your grade-so-far Each grading item will have "Gradelines" assigned to it. For example, if the B gradeline is 70, the A gradeline is 85, and your score is 80, then your GPA grade, **G**, for that item is $\mathbf{G} := 3 + \dfrac{80-70}{85-70} = 3.67$ (**G** is rounded to 2 places). In other words, your GPA grade is B, plus 2/3 of the way between B and A. Your GPA grade, **G**, on any grading item is computed using your score on it, and numbers **g** (the grade corresponding to the highest gradeline smaller or equal to your score: **g**=2 if your score is at least the C gradeline, and less than the B gradeline), **glb** (the highest gradeline smaller than or equal to your score), **gla** (the lowest gradeline greater than your score):

$$\mathbf{G} = \mathbf{g} + \frac{\mathbf{your\ score} - \mathbf{glb}}{\mathbf{gla} - \mathbf{glb}}$$

where **glb** is the gradeline just below or equal to your score, **gla** is the next gradeline - the first one above your score, and **g** is the grade number: 5 for a 100% score, 4 for the A gradeline, 3 for B, etc. If your score falls on a gradeline, then $\mathbf{G} = \mathbf{g}$. If your score is 100% on a Test, your $G = 5$.

When the **G**'s are multiplied by their corresponding weights, and added, the result is your GPA grade for the course. If your total is within 0.02 of the defining value of one of the 10 grades that currently exist, your grade is "borderline." Case-by-case decisions are made then, whether to award the higher or the lower grade. One important factor is the direction your grades have taken at course's end.

Be sure to talk to me in advance if you have to miss a Test! If you do miss a Test, and you don't make arrangements in advance, your G for that Test is zero! Ask your TA about their corresponding rules!

If, for documented reasons beyond your control, you're passing and you can't complete the course, your grade up to that point may "stay with you" as part of an Incomplete; all I's must be issued according to department guidelines.

SCHOLASTIC CONDUCT

Please read the (appropriate for you) notices in the IT Bulletin, the CLA Bulletin, and so on. You are encouraged to work with others in understanding what problems say, setting up solutions, and so on, but you must submit as YOUR work only what YOU have written up yourself, in your own words! If you get ideas from a reference or from someone else, GIVE CREDIT! Do not simply copy another person's work or copy a solution found in a book. Graders will be asked to bring answers that look alike to my attention.