We will study a recent topic in mathematics (discrete wavelets), and how it is applied to the practical problem of digital image processing, in particular digital image compression. While some of the underlying ideas go back to Joseph Fourier (1768-1830) and Alfred Haar (1885-1933), quite a bit of the material you will see is not older than 30 years.

Here are the major course objectives:

1. You will develop an understanding of the theoretical underpinnings of wavelet transforms and their applications.
2. You will learn how to use a computer algebra system for mathematical investigations, as a computational and visualization aid, and for the implementation of mathematical algorithms.
3. You will get a flavor of the ideas and issues involved in applying mathematics to a relevant current engineering problem.

The course will consist of a mixture of traditional lecture and computer lab work, and will have a very applied flavor. You will use Mathematica extensively. While prior knowledge of the software is not required, I expect you to spend a considerable amount of time learning how to use Mathematica.

Prerequisites for this class include a working knowledge of Calculus II; some very minimal knowledge of matrix algebra will also be helpful. On the other hand, this is an upper-division course for math majors, so I expect students to have some mathematical maturity (≈ familiarity with the method of proof).

The Textbook for the course is P. van Fleet: *Discrete Wavelet Transformations: An Elementary Approach with Applications*, Wiley. The book is currently available at Amazon.com for $86.59.

This course can count as an upper-division math elective for math majors.

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