

Linear Analysis of Continuous & High-Dimensional Systems

Linearity, as first encountered in the algebra of vectors and matrices, provides the foundation for many other branches of mathematics. This course provides an introduction to two directions that directly follow from the ideas of linear algebra. The first is the classical extension to function spaces, and is presented within the specific context of Fourier analysis. Expansions upon this development naturally lead to the theories of orthogonal polynomials, Hilbert spaces and linear operators. These ideas will be investigated mainly from the perspectives of classical real analysis, but will also include concrete illustrations using elementary numerical computing. The second is the modern development of large-matrix algorithms, many of which are based upon well-established principles of linear operator theory, and are now made feasible by advances in computational speed and memory. Examples include the fast Fourier transform, the singular value decomposition, and Krylov subspace methods.

In this fourth-year course, the lectures will invoke aspects of both rigorous analysis and elementary numerical computing. Computer visualization will be an important accompaniment to the lectures and assigned work. The rudiments of numerical computing and graphics will be introduced through the use and modification of downloadable Matlab scripts.

Professor:	David Muraki, summer desk K10508 (office K10538)
Lectures:	Monday 2:30-3:20pm & Wednesday, 2:30-4:20pm in AQ3005
Office Hours:	tuesday 3:00-5:00pm or by special appointment (arrangements by request/e-mail)
Reading:	<i>A First Course in Wavelets with Fourier Analysis</i> A Boggess & FJ Narcowich, Prentice-Hall (2001)
Webpage:	visit www.math.sfu.ca/~muraki & follow class link updated weekly — assignments, computing demos & announcements link to online notes from main library
Communication:	<u>webct-based discussion postings as primary class e-mail</u> <i>muraki@sfu.ca</i> : private class-related e-mail correspondence only <i>muraki@math.sfu.ca</i> : urgent correspondence only please
Computing:	Matlab is the recommended computing environment lecture & homework scripts will be posted on class webpage Matlab accessible via campus network & assignment lab (AQ3144)
Responsibilities:	weekly assignments ($\approx 40\%$) active participation in class & e-mail discussions midterm ($\approx 25\%$) & final exam/project ($\approx 35\%$)