

Discrete Tools for a Continuous World

Many computing algorithms as used in science and technology are based upon the fundamental mathematics of the calculus and linear algebra. Modern computing environments include many of these tools as part of their built-in library of routines. Of essential importance to users are the benchmarking of implementations, selection among multiple variants, and the identification of limitations or failure modes. The latter can be particularly relevant when these routines are called within larger complex codes, or when the limits of extreme system size are encroached upon.

The aim of this course is to give an overview of the common mathematical algorithms used in scientific computing, with particular emphasis on connecting their analytical properties with implementational performance. Numerical routines will be explored and analyzed to their Olympian limits of “faster, larger, more accurate.” More mundane questions like, “What are the notes in the opening chord of the Beatles’ song, *A Hard Day’s Night*?”, will also be pondered.

Students are expected to be comfortable with the pre-requisite mathematics, the Calculus of Functions and Linear Algebra; in addition to having advanced programming experience (coding & debugging). The course assignments will be a blending of computation and theory, which serve to illustrate the ideas presented in lecture, and allow prior experimentation with the numerical routines. Matlab will be the default computing environment for the class.

Professor:	David Muraki, office K10538, phone 778.782.4814
Lectures:	Monday/Wednesday/Friday at 12:30-1:20pm in AQ 3159
Office Hours:	Tuesday 2:00-4:00pm or by special appointment (arrangements by phone/e-mail)
Readings:	<i>Numerical Methods with Matlab</i> , G. Recktenwald, Prentice-Hall (2000)
Web Access:	webct & www.math.sfu.ca/~muraki : follow class links updated weekly — assignments, computing demos & announcements
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 & Maple are the recommended computing environments lecture & homework scripts will be posted on webct page Matlab & Maple accessible via campus network & assignment lab (AQ3144)
Responsibilities:	weekly assignments ($\approx 40\%$) active participation in class, notetaking & webct discussions midterm ($\approx 25\%$) & final exam ($\approx 35\%$)