Math 118, Fall 2022

Instructor: Prof. Jon Wilkening
Office: 1051 Evans Hall
Office Hours: Tues 3:45-4:45, Wed 2:30-3:30
e-mail: wilkening@berkeley.edu (emergencies & administration only. No questions about HW, please)
online discussion forum for our class: edstem.org

Course Announcements, Homework Solutions, etc: https://bcourses.berkeley.edu/

Lectures: TTh 2:10-3:30 PM, 202 Wheeler


Prerequisites: Math 53 and 54 or equivalent. (Math 104 and 110 helpful but not required.)

Syllabus: This course will cover the basic mathematical theory and practical applications of
Fourier analysis, polynomial approximation, and wavelets, including one-dimensional
signal processing and multi-dimensional image processing.

- Vector spaces, inner products, norms, convergence
- Fourier series, orthogonal systems, sampling and aliasing, FFT
- Fourier integrals and transforms, linear filters, sampling theorem, uncertainty principle, two-dimensional Fourier analysis
- Polynomial approximation, orthogonal polynomials, numerical quadrature, Chebyshev interpolation
- Haar wavelets, Daubechies wavelets, scaling functions, multiresolution analysis, filter banks
- Approximation with wavelets, linear and nonlinear techniques, image compression, JPEG-2000

Grades: Each exam will have a formula for converting your raw score into a scaled score (to
account for the fact that the exams may not be of equal difficulty.) The curve will never
lower your score – if everyone does well on an exam, we will use the raw scores. These
scores are combined into a final grade using the following weights:

Homework: 40%. 11 assignments, 2 lowest scores dropped
Midterm: 20% or 0% (Thursday, October 20, in class.) (Replaced by scaled score on final)
Final: 40% or 60% (Dec 13, 8:00-11:00 AM, Location TBA) (if it is higher)
No make-up exams for any reason.. don’t miss the Final exam!

(scaled scores will be determined with these grade cutoffs in mind)

Incomplete grades: (University policy) A grade of I will only be given if “your work in a course has
been of passing quality but is incomplete for reasons beyond your control”

Homework: Homework must be uploaded to gradescope by 11:59 PM each Wednesday. Late
assignments will not be accepted. Please write dark and legibly and keep the problems
ordered. There are many inexpensive scanning apps for smart phones (e.g. turboscan). It’s also
worthwhile to learn latex and prepare your homework solutions that way. You may discuss the
homework problems with your classmates, but you must write up your own solutions. Searching
for solutions on the internet or copying your friends’ homework solutions is cheating and defeats
the purpose. We will have records of all your submitted work and it is usually easy to tell if copying
has occurred, even with changes of variable names, etc. The two lowest homework scores will be
dropped. Some homework problems will involve a computational component to try out the
theory on a computer. This will not involve extensive coding. Matlab or Python are suggested
languages, but if you prefer another programming language, just let me know.