\[ \nabla^2 u = f(x, y, z) \]

\[
\begin{aligned}
    u &= \sum_k c_k \phi_k \\
    c_k &= -\frac{\langle f, \psi_k \rangle}{\lambda_k \langle \phi_k, \psi_k \rangle} \\
    u &= \int G f \, d\tilde{x} \\
    G &= -\sum_k \frac{\psi_k \phi_k}{\lambda_k \langle \phi_k, \psi_k \rangle}
\end{aligned}
\]

Fall 2020 [6862]
Prof. Thomas Witelski
Mon,Wed,Fri 1:40–2:30 pm
Room 259 Physics Building
http://www.math.duke.edu/~witelski/551

A course on analytical methods for solving linear differential equations:

- Fourier eigen-expansions and spectral theory for linear operators
- Adjoint problems and Fredholm integral equations
- Separation of variables for PDE in 2D, 3D
- Green’s functions and integral representations of solutions
- Complex contour integrals and Fourier/Laplace transforms

Applications:

- Theoretical foundations for many problems in engineering and science
- Basis for advanced computational methods
- Designed for students in applied math, science, and engineering

Prerequisites: Undergraduate-level background in linear algebra and ordinary differential equations.