Duke UNIVERSITY Dept of Mathematics

MATH 551: Applied Partial Differential Equations and Complex Variables

$$\nabla^2 u = f(x,y,z) \qquad \begin{cases} u = \sum_k c_k \phi_k & c_k = -\dfrac{\langle f, \psi_k \rangle}{\lambda_k \langle \phi_k, \psi_k \rangle} \\ u = \int G f \, d\tilde{\mathbf{x}} & G = -\sum_k \dfrac{\psi_k \phi_k}{\lambda_k \langle \phi_k, \psi_k \rangle} \end{cases}$$

Fall 2020 [18205/18206]
Prof. Thomas Witelski
Mon, Wed, Fri 1:45–2:35 pm
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.

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