Connections to undergraduate courses  I mentioned a number of links between the topics of the talk and courses within the Mathematics degree at Oxford. A brief description of these courses is given below, together with a link to the corresponding course webpage.

• First year

  – **Introductory Calculus** and **Multivariable Calculus** introduce some of the machinery needed for the calculus of more than one variable.
  – **Fourier Series & PDEs** introduces some analytical techniques for finding the solutions of each of the three equations (Wave, Diffusion and Laplace) that I discussed.

• Second year

  – Laplace's equation is used extensively to understand how fluids flow, and therefore makes up a large portion of the course **Fluid Dynamics & Waves**.
  – A first course on the algorithms needed in many other problems is the subject of **Numerical Analysis**.
  – The SIR model for the spread of infectious diseases is introduced in the course **Mathematical Modelling in Biology**.

• Third Year (and beyond)

  – More advanced techniques for the solution of the wave equation are introduced in the third year course **Waves & Compressible Flow**, which also discusses eigenfunctions in 2D and 3D (including those of a circular drum).
  – Pattern formation in biological systems, including animal patterning, is discussed in the third year course **Further Mathematical Biology**.
  – Detailed studies of the numerical methods needed to solve the Diffusion Equation in **Numerical Solution of Differential Equations I** and of the Wave and Laplace equations in **Part II**.
  – Laplace’s equation, and its solutions, reappear in **Electromagnetism**.

Some light reading and viewing

• Many more examples in the spirit of those given in the talk are discussed in the book ‘**A Very Short Introduction to Applied Mathematics**’ by Alain Goriely.

• The essay ‘**On being the right size**’ by J. B. S. Haldane presents an entertaining discussion of the implications of scalings and dimensional analysis in biology.

• A public lecture by Robin Thompson describing mathematical modelling of infectious diseases (including the Covid-19 outbreak and the answers to some questions) can be found [here](#).