

## MECHANICAL & INDUSTRIAL ENGINEERING COLLOQUIUM: ME 791

### The mechanics of living cells — order amongst disorder

**Speaker:**

Vikram Deshpande, PhD  
Professor, Faculty of Engineering at the University of Cambridge

Wednesday, November 09, 2022  
221 MEC  
1:00 to 2:20 pm

**Abstract:**

Living cells evade thermodynamic decay aided by the exchange of nutrients with their environment and are quintessential examples of out-of-equilibrium systems. These nutrient exchanges also fuel large non-thermal fluctuations, but cells nevertheless maintain a homeostatic state over a timescale of hours to days. We use these observations to motivate a statistical thermodynamic theory for the “equilibrium” of adherent cells. Numerous, sometimes counterintuitive observations, of cell behaviour can be rationalised using this formalism and we shall discuss phenomena where cells attain a specific type of order by maximising their overall disorder. Examples that will form the focus of the talk include: (i) “contact guidance” — the widely known phenomenon of alignment of single cells induced by anisotropic environmental features and (ii) the spatial organisation of cells within micro-tissues which serves as the precursor to morphogenesis.

**Bio:**

Prof. Vikram Deshpande joined the faculty of Engineering at the University of Cambridge as a lecturer in 2001 and was promoted to a professorship in Materials Engineering in 2010. He has held positions at the University of California, Santa Barbara and the Technical University of Eindhoven in the Netherlands. He has written more than 280 journal articles in experimental and theoretical solid mechanics. He has been awarded medals that include the 2020 Rodney Hill Prize in Solid Mechanics, the 2022 William Prager Medal, the 2022 ASME Koiter Medal and elected Fellow of the Royal Society, London.

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