UCLA Engineering
HENRY SAMUELI SCHOOL OF
ENGINEERING AND APPLIED SCIENCE

BIOENGINEERING

PRESENTS

Nuclear Mechanogenomics & Early Disease Diagnosis

WEDNESDAY, DECEMBER 7, 2016
1:00 – 2:00 PM
2101 ENGINEERING V

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ABSTRACT:

Physico-chemical signals from the extracellular matrix impinge on cellular geometry resulting in altered functional nuclear landscape and gene expression. While these alterations regulate diverse biological processes including stem-cell differentiation, developmental genetic programs and cellular homeostasis; the mechanistic principles underlying such control systems are unclear. Using a multidisciplinary approach by combining high resolution optical imaging, quantitative single-cell biology, machine learning and functional genomics, our laboratory investigates the principles underlying the coupling between nuclear mechanics and genome regulation. I will describe our ongoing work that provides modular links between cellular geometry and nuclear mechanics and its impact on transcription dependent 3D organization of chromosomes and reprogramming. Such optimized modular links define the normal state of cells and these links are altered during diseases. In this context, our studies have profound impact on developing single-cell nuclear biomechanical markers in early disease diagnosis for therapeutic intervention.

BIOGRAPHY:

Dr. Shivashankar is currently the Deputy Director of Mechanobiology Institute, National University of Singapore. Shivashankar's laboratory is focused on understanding the role of extra-cellular matrix signals on nuclear mechanics and genome regulation in living cells using a multi-disciplinary approach. He carried out his PhD research at the Rockefeller University (1994-1999) and Postdoctoral research at NEC Research Institute, Princeton USA (1999-2000). He started his laboratory at the National Center for Biological Sciences, TIFR- Bangalore, India (2000-2009) before relocating to a tenured faculty position at the National University of Singapore in 2009. His scientific awards include; the Birla Science Prize (2006), The Swarnajayanthi Fellowship (2007) and was elected to the Indian Academy of Sciences (2010). He Edited the Methods in Cell Biology series book on "Nuclear Mechanics and Genome Regulation" (2010), Elsevier Press. More recently he Heads the Joint Research Laboratory with FIRC Institute of Molecular Oncology (IFOM), Milan, Italy and was appointed as an IFOM-NUS Chair Professor in 2014.