



**Department of  
Mechanical Engineering  
The University of Hong Kong**



## SEMINAR

**Title: Exploring Structure, Mechanics, and Function in Soft Biological Systems Across Scales**

**Speaker: Dr. Jing Xia**  
**Postdoctoral Associate**  
**Chemical & Biological Engineering**  
**Princeton University**  
**USA**

**Venue: Rm 7-34/35, Haking Wong Building**

**Date: 14 March 2025 (Friday)**

**Time: 9:30am**

### **Abstract:**

Soft biological systems exhibit intricate hierarchical organization, with structures spanning multiple length scales, from tissues to cells and molecules. This structural complexity gives rise to rich mechanical behaviors that profoundly influence biological function. My research integrates soft matter physics and biology to establish a unified framework that connects structure, mechanics, and function in soft biological systems. In this talk, I will demonstrate how this framework applies to diverse biological components, including biomaterials, cells, and molecular assemblies. At the bulk material scale, I reveal how the hierarchical microstructure of biomaterials, such as fibrin, underpins their extraordinary resilience and complex

mechanical behavior. At the cellular scale, I uncover the distinct roles of cytoskeletal components in shaping the cell's internal mechanical environment. At the molecular scale, I explore biomolecular condensates, which are dynamic, membrane-less compartments that are essential for cellular processes, highlighting how nuclear organization and mechanics influence their formation and behavior. Building on these insights, I will demonstrate how stem cells sense and respond to structural cues in their microenvironment, influencing cellular behaviors such as spreading, migration, and differentiation. By integrating insights across these scales, my work advances our understanding of the physical principles that govern soft biological systems, and informs strategies for designing cell-instructive biomaterials and guiding cellular behavior for tissue engineering applications.

**ALL INTERESTED ARE WELCOME**

**For further information, please contact Prof. Mingxin Huang**