Seminar Abstract **K. Jane Grande-Allen, Ph.D.**

"Biophysically Faithful Biomaterial Platforms for Cardiovascular and Intestinal Mechanobiology"

The material behavior of many biological tissues is due to their unique microstructural arrangements of fibrous extracellular matrix (ECM) proteins, i.e., collagen and elastin, within the more amorphous matrix. The orientation of these fibers, and their segregation into discrete regions within the tissues, often gives rise to anisotropy and unique biological stress-strain behavior that enables the essential function of the tissues. Layered or segregated structuring allow hierarchical tissue organization in a manner designed to withstand external forces efficiently while protecting more delicate tissues and cells from damage. These structure-function relationships within biological tissues have been studied for decades but have not been widely translated into the creation of biomimetic scaffolds for use in tissue engineering and *in vitro* analyses of cell and tissue biology. The Grande-Allen research group has focused on integrating these structural and material characteristics into hydrogel and fibrous biomaterials using a range of fabrication techniques including molding, photolithography, electrospinning, and 3D printing. The majority of our investigations have addressed heart valve disease, which is widely prevalent in our society, with valve replacement or repair in almost 100,000 people in the United States and 275,000 people worldwide each year. More recently, we have translated our fabrication strategies to generate biomaterial platforms for investigating intestinal epithelial cell biology and enteric diseases.