

THE UNIVERSITY OF ALBERTA

Department of Mathematical and Statistical Sciences

Special Talk

“Mathematical modelling of intracellular polarization”

**Adriana Dawes
Center for Cell Dynamics
University of Washington**

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CAB 657 @ 3:00 p.m.**

Abstract:

Many cells are capable of polarizing in response to a stimulus by segregating specific molecules to distinct domains in the cell. Intracellular polarization is required for many important biological processes including wound healing and embryonic development, but is also implicated in disease processes such as metastatic cancer. In this talk, I will present a model of intracellular polarization in crawling cells that couples biochemical dynamics with spatially directed force generation. This model, based entirely on experimental observations, differs substantially from other proposed models and may explain observed behaviours of normal and mutant crawling cells. I will then discuss my recent theoretical and experimental work modelling polarization of single-cell embryos of the nematode worm *C. elegans*. A theoretical model of protein interactions in the early embryo suggests the presence of a bistable switch mechanism, and experimental results are consistent with model predictions. Finally, I will discuss possible future directions for work on intracellular polarization, including novel modelling and experimental techniques that will further our understanding of this fundamental biological process.