

RYERSON UNIVERSITY
DEPARTMENT OF MATHEMATICS
BIOMATHEMATICS & FLUIDS SEMINAR

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Princess Margaret Cancer Center

Date: Thursday, February 25, 2016

Time: 9:30am

Location: ENG 358

**Mathematics: A Key to Probe Complex
Biological Systems**

Abstract:

The 21st century has witnessed a tremendous success in applying mathematical models to clinical and biological problems. Two important components of this success is synergy between the mathematicians and clinicians as well as continuous sampling of biological data to validate these mathematical models. This allows us to dwell on the spatial and temporal aspects of a complex biological phenomena, rather than focussing solely on the steady state systems. In this talk, we will discuss some of the successful applications of mathematics to the field of biomedical research (specifically in cancer treatments), and evolutionary biology. One of the key challenges that clinicians face in cancer treatments is to reduce the therapy induced toxicity levels to patients. This talk will emphasize on biologically motivated mathematical models to study the impact of cancer treatments like charged particles and chemotherapeutic drugs on the risk of therapy induced malignancies. The proposed models would serve as a tool to guide the clinicians to enable better treatment design. In the area of evolutionary biology, the systems are traditionally described by deterministic models, which fail to capture important aspects like randomness in microenvironment and invasion probability. To incorporate these aspects, a stochastic formulation is proposed, which investigates the evolution of species on spatially varying heterogeneous systems. All the aforementioned models capture some of the salient features of the biological systems. However, further research is required to increase the predictive capability of these models by incorporating more biological information. In future, mathematical methods coupled with computational techniques can improve the understanding of different biological problems in the area of tumor biology, therapeutic treatments, evolutionary dynamics of diseases and biological networks. In this regard, mathematics applied to biology and medicine is beginning to take centre stage as one of the theoretical tools by providing a robust in-silico framework, which in turn could potentially open new research avenues to investigate the unexplored biological frontier.

ALL FACULTY, STAFF, STUDENTS AND GUESTS ARE WELCOME TO ATTEND
LIGHT REFRESHMENTS WILL BE PROVIDED