# CCSU
## DEPARTMENT OF MATHEMATICAL SCIENCES

# COLLOQUIUM

Friday, September 30
3:00 – 4:00 PM
Maria Sanford, Room 101

## ONCOLYTIC VIRUS VS CANCER: MODELING AND SIMULATION OF VIROTHERAPY WITH DIFFERENTIAL EQUATIONS

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**Abstract:** Mathematical models are useful analytical tools that can help medical practitioners in understanding cancer treatment options. Testing various treatment assumptions and scenarios by varying the parameters in a mathematical model can provide analysis that may help in predicting prognosis for patients, in improving the effectiveness of treatments plans, and in providing deeper insights into questions that cannot be addressed by clinical or experimental studies alone. In this talk, I will discuss a model that simulates virotherapy as a treatment approach for spherical tumors. Using a system of five nonlinear ordinary differential equations, the complex dynamics between cancer cells, infected cancer cells, oncolytic viruses, immune cells, and dead cancer cells is investigated using analytical methods and numerical simulations. The model is analyzed qualitatively by computing the equilibria and deriving conditions for their local stability. The rate of change of the tumor's radius is derived and used to provide the basis for numerical simulations that establish effectiveness of virotherapy as a treatment. Numerical simulations and sensitivity analysis are performed to identify parameters with greatest effect for the success of virotherapy which could be then implemented into the derivation of optimal therapeutic strategies.

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