MEMORANDUM

DATE: October 20, 2020

TO: Faculty and Students

FROM: Professor(s)  
Eric Kostelich  
Chair/Co-Chairs of  
Trevor Reckell  
Defense for the  
MA in  
Mathematics  
Committee Members  
Alex Mahalov  
Yang Kuang

DEFENSE ANNOUNCEMENT

Candidate: Trevor Reckell
Defense Date: 10/23/2020
Defense Time: 4:00 PM
Virtual Meeting Link: https://asu.zoom.us/j/97054934946
Title: Modeling the synergetic properties of drugs in hormonal treatment for prostate cancer

Please share this information with colleagues and other students, especially those studying in similar fields. Faculty and students are encouraged to attend. The defending candidate will give a 40 minute talk, after which the committee members will ask questions. There may be time for questions from those in attendance. But, guests are primarily invited to attend as observers and will be excused when the committee begins its deliberations or if the committee wishes to question the candidate privately.

ABSTRACT

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ABSTRACT

Efforts to treat prostate cancer have seen an uptick, as the world’s most common cancer in men continues to have increasing global incidence. Clinically, metastatic prostate cancer is most commonly treated with hormonal therapy. The idea behind hormonal therapy is to reduce androgen production, which prostate cancer cells require for growth. Recently, the exploration of the synergistic effects of the drugs used in hormonal therapy has begun. I have aimed to build off of these recent advancements and further refine the synergistic drug model. The advancements I implement come by addressing biological shortcomings and include improvements to the model’s internal mechanistic structure. The drug families being modeled, anti-androgens and gonadotropin-releasing hormone analogs, interact with androgen production in a way that is not completely understood in the scientific community. Thus the models representing the drugs show progress through their ability to capture their effect on serum androgen. Prostate-specific antigen is the primary biomarker for prostate cancer and is generally how population models on the subject are validated. Fitting the model to clinical data and comparing it to other clinical models through the ability to fit and forecast prostate-specific antigen and serum androgen is how this improved model achieves validation. The improved model results further suggest that the drugs’ dynamics should be considered in adaptive therapy for prostate cancer.