Print Form

DEPARTMENT OF MATHEMATICS

VIGRE Funding Report

(due 30 days after semester of support)

Semester/Summer and Year: Fall 2008

Name: Mark Robertson-Tessi

List the graduate courses you have taken this semester (including independent studies), your grades, and the instructors:

Course	Title	Grade	Instructor
Math 596A	BIOMATH Seminar	A	Watkins
Math 920	Dissertation	K	Goriely
Math 520	Complex Analysis	A	Newell

List the title, date and location of any talks you have given, either here or elsewhere:

A Mathematical Model For Tumor-Immune System Interactions Following Cytoreductive Treatment; Presented at the AM Brown Bag Seminar, Dec. 2008

If you are working on your dissertation, include a one paragraph description of your research progress. If you have not yet begun dissertation research, describe your progress toward finding a dissertation topic and advisor and beginning that research.

I am currently examining the results of the tumor-immune model, and performing analysis on the system to explain the dynamic behaviors observed. I am also comparing model results to experimental results presented in the literature. I have begun to write my dissertation, and am also preparing a paper for publication.

List publications, if any.

None this period

Check all activities you completed during the funded period:

Academics:

- ☐ Independent Study
- ☐ Oral Comprehensive Exam
- ☐ Commence Thesis Research
- ☐ Conference attendance
- ☐ Conference participation
- ☐ Complete PhD

Professional development and outreach:

- ☐ AP Calculus Visit
- ☐ High School Workshops
- ☐ Undergraduate Research Project
- ☐ Undergraduate Research Seminar
- ☐ Super TA
- ☐ Mentoring junior graduate students for the qualifying exams
- ☐ RTG (help organize)
- ☐ Research Seminar (help organize)

☒ Other (please specify)

Worked on materials for the Applied Math First-Year Laboratory

Attach a brief statment about your academic progress and professional development during the period of support.

Vigre Semester report
January 16, 2009
Mark Robertson-Tessi

In the fall semester, I continued my dissertation research. I worked with the completed model of tumor growth interactions with the immune system and chemotherapy. This research was primarily in conjunction with my advisor Dr. Alain Goriely of Math, and Dr. Ardith El-Kareh of Physiology. The model was initially an expansion of a few existing models in the literature, but after consulting with a colleague in Immunology (Dr. Emanuel Akporiaye) and surveying the immunological literature further, we took a new tack by incorporating some recent results on regulatory T Cells. Previous models had dealt with tumor cell inhibition of immune system effector T cells directly. New research suggests the importance of regulatory T-cells cannot be ignored.

At the moment, I am generating results from the model, and also analyzing the dynamics to examine the possible behaviors predicted. I am comparing model results with experimental data from the literature as well. I have begun to write my dissertation, now that a significant portion of research is behind me.

For my course work, besides six credits of dissertation units, I took a class in Complex Analysis with Dr. Alan Newell. I received an A in the class. I also attended the Biomath seminar, in which I presented on my own research, as well as on Neurobiology and population genetics, receiving an A for the semester.

I presented the tumor immune model at the App. Math Brown Bag Seminar in Dec 2008.

My integration work, which I will continue into the spring semester, involves working on materials for the Applied Math laboratory.

In the spring, I will take a Cancer Therapeutics course, the Biomath seminar, and dissertation research units. I will focus on analyzing the equations, preparing a paper for publication, and continuing to write my dissertation. With assistance from Drs. Goriely and El-Kareh, we have a set of questions which we feel that a working model can answer. These questions address the ability of the immune system to tackle a tumor, and also the magnitudes of the various suppressive effects.