Gerry Baygents, PhD candidate

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EDUCATION:

University of Missouri - Kansas City, Kansas City, MO

- *PhD candidate in Statistics/Applied Mathematics* (anticipated completion) May 2018
  Thesis title: Multi-patch modeling and analysis of hemorrhagic diseases in Missouri's white-tailed deer
  Supervisor: Dr. Majid Bani-Yaghoub

University of South Carolina, Columbia, SC

- *MS in Mathematics, cum laude* May 1996
  Thesis title: Reducibility criterion in polynomials with non-negative coefficients
  Supervisor: Dr. Michael Filaseta

Georgia Southern University, Statesboro, GA

- *BS in Mathematics, magna cum laude* May 1993

TEACHING EXPERIENCE:

University of Missouri – Kansas City, Kansas City, MO
Adjunct Lecturer and Graduate Teaching Assistant 2005 – present

- Taught forty undergraduate courses including trigonometry, single and multivariable calculus, and introductory statistics, utilizing WileyPLUS and MyMathLab platforms as part of course curriculum (average score on student evaluations: 4.2/5)

Richland County School District One, Columbia, SC
Distance Learning Instructor 2002 - 2003

- Taught Advanced Placement BC Calculus II in multiple schools across the district
- Operated a V-Tel teleconferencing lab as part of the distance learning curriculum

University of South Carolina, Columbia, SC
Part-time Instructor and Graduate Teaching Assistant 1993 - 2002

- Taught undergraduate algebra and calculus (both traditional and applied). Classes include Basic College Mathematics, Calculus for BA and Social Science Majors, and Calculus I
- Teaching assistant for calculator-based applied calculus course

Midlands Technical College, Columbia, SC

- Taught introductory computer course to Upward Bound students 1997

RELATED EXPERIENCE:

University of Missouri – Kansas City, Kansas City, MO

Math and Science Resource Center Tutor 2010 - 2014

Math Success Lab Tutor 2015

- Provide one-on-one assistance to students in math, statistics, and physics
- Demonstrated ability to tutor a variety mathematics courses ranging from Math for Liberal Arts to Differential Equations, Elementary and Mathematical Statistics
- Lead group study sessions prior to final exams

University of South Carolina, Columbia, SC

Tutor 1998-1999

- Provided one-on-one assistance to students in math

OTHER ACTIVITES

- Organized Integration Bee 2016 – 2017
- Chaperone, Missouri Collegiate Mathematics Competition 2017

HONORS AND AWARDS:

- Graduate Teaching Assistant at the University of Missouri Kansas City 2005 – 2010
- Graduate Teaching Assistant at the University of South Carolina 1993 – 1996
- Travel grant to Joint Mathematics Meeting 2017 and 2018

PUBLICATIONS:

- *A mathematical model to analyze spread of hemorrhagic disease in white-tailed deer population* Journal of Applied Mathematics and Physics, Vol.5 No.11(2017), Paper ID 80667, DOI:10.4236/jamp.2017.511184 2017
- *Cluster analysis of hemorrhagic disease in Missouri's white-tailed deer population: 1980 – 2013* (submitted)

PRESENTATIONS:

- Math and Science Research Day, UMKC
  Spatial and spatio-temporal cluster analysis of hemorrhagic disease in Missouri's white-tailed deer population 2016
  Multi-patch modeling and analysis of hemorrhagic diseases in Missouri's white-tailed deer 2017
- Joint Mathematics Meeting, Atlanta GA 2017
  Transmission dynamics of bluetongue and epizootic hemorrhagic diseases in a patchy environment
- Three Minute Thesis competition, UMKC 2017
- Colloquium Talk, UMKC Department of Mathematics and Statistics
  Modeling migratory effects of white-tailed deer on dynamics of HD: reducing risk of outbreaks via isolation 2017
- UMKC Graduate Seminar, *Linearizing Disease Models with Distributed Delay* 2017

PROFESSIONAL SOCIETIES:

- American Mathematical Society
- American Statistical Association

REFERENCES:

Dr. Majid Bani-Yaghoub, Assistant Professor, baniyaghoubm@umkc.edu, 816 – 235 - 2845
Dr. Eric Hall, Associate Professor and Department Chair, halle@umkc.edu, 816 – 235 – 5852
Dr. Richard Delaware, Teaching Professor, delawarer@umkc.edu, 816 – 235 – 2850
Mr. John Swartz, swartzjo@umkc.edu, 816 – 235 - 5966

Teaching Responsibilites,

My teaching responsibility in the Department of Mathematics and Statistics is to teach undergraduate math and statistics courses. I regularly teach the following courses:

- Calculus 1
  Topics include limits, differentiation, function analysis, applications of the derivative, integration and applications. Class size is typically 30 – 40 students.

- Calculus 2
  Topics include applications of integration, advanced integration techniques, sequences and series, parametric equations, and polar coordinates. Class size is typically 25 – 35 students.

- Calculus 3
  Topics include vectors and vector operations, coordinates and geometry in three dimensions, vector functions and analysis, multivariable functions, partial derivatives, optimization, double and triple integration, and vector calculus. Class size is typically 15 – 25 students.

- Elementary Statistics
  Topics include descriptive statistics and interpretations, discrete probability distribution functions including the binomial distribution, continuous probability distribution functions including the normal distribution, applications of the normal distribution, hypothesis testing, and introductory regression. Class size is typically 30 – 40 students.

In addition to these courses, I have taught Precalculus, Trigonometry, and Math for Liberal Arts Majors. While at the University of South Carolina, I also taught Calculus for Business and Life Science Majors, a calculator-based course that focused heavily on applications.

Teaching Philosophies and Methods

Too often in math courses, students fixate on **what** is the answer. My job as a math instructor is to focus on **why** as much as what. This comes in two forms. First is the mechanical structure and rigid sets of rules within mathematics as whole. Students make computational errors because they are not following the rules properly, and they need to know why their computation is incorrect and how and how the correct use of mathematical laws leads to the correct result. Secondly, even when students are computing and simplifying correctly, they may not understand or fully realize why a particular sequence of steps leads to a desired result. I have observed students working problems correctly online when they are being prompted with the steps, but when they have to do the same problem on an exam, they're not sure what to do. I have heard multiple calculus students say that, for most any exam problem, if you don't know what to do, compute a derivative and set it equal to zero. Admittedly, this is a frequent step, but there are many situations where it is not needed. Therefore, I try to emphasize why a student is differentiating (or whatever is appropriate). I like to explain the workflow in non-mathematical terms, and then discuss what mathematics will accomplish what is needed. For most problems, the answer isn't the answer; the workflow is the answer. I don't give full credit for correct answers. I give full credit for correct work. If the work is correct, then "the answer" will be correct. Homeworks usually have written portions – explain, justify, prove, what do you think, etc. If students understand why they are performing steps in a certain way, they are more likely to get an answer correct. With statistics – at least elementary statistics – you have to make the class about concepts, vocabulary, and interpretation and not about the math. The formulas are already in place, and calculators and computers will handle the computations, so what the student needs to study, for example, is which of the formulas for computing a standard deviation is needed for this particular kind of situation.

One of the things I say most often, both in the class and in tutoring, is “Math in your head is dangerous. If you’re not doing it on paper, you’re doing it wrong. Even if you have the right answer, you’re doing it wrong.” I like to tell students that Missouri is the Show-Me State, so you have to show me your work.
This actually covers a few different situations. First, there is the chance for making computational errors. Second, writing something down (or drawing a picture) helps to refine and clarify thoughts and ideas. Plus, actually seeing something on the paper may trigger the next step. One time I was helping a student with trigonometric equations and I told him to rewrite his last step, but to write “cos2x” next to “sin2x”. Puzzled, he did it, and after a moment he realized that that part of the expression could be simplified to 1. In my elementary statistics course, I require all problems concerning normal probabilities have a picture submitted and really make those probability computation an exercise in computing areas, (and you have to see the area, right?), particularly if the table in the book requires the area to be under a certain portion of the distribution curve. Finally, getting ideas on paper means that you’ve actually made an attempt. I tend not to help students as much who don’t at least try something (even if I have to suggest what to try).

I also believe that, whenever possible, when I introduce a new topic or technique, it should actually be the second time the student comes across it. Toward the beginning of the course, I assign small problems that eventually turn out to be a part of an overall larger problem. I may ask students to speculate on something – a speculation without a grade attached – that turns out to be next week’s topic.

I am often stunned by the lack of mathematical skills in college students, even just the basics. Students need to learn that the level of expectation is much higher in college than in high school. I don’t preach to them about this, but I assign problems to push them (not too much!), and when I lecture, I will say things like, “In an algebra setting you learned…” or “Of course you recall that …” I will even sometimes specify that results be written as a reduced fraction (and not as a decimal).

Finally, I like to cultivate a little bit of confidence in students. When a student works a problem on the board, I like to point out all the things that are correct even if the answer isn’t right. I encourage students to ask questions, even if I have to pull the questions out of them (even if it’s not a math question!). I have also been known to tell a student who has come for an office visit to ask that same question in class the next day.

Future Goals

Until I have an entire class that scores perfectly on all assignments, there is always room for improvement. Different students have different learning styles, and I like learning new methods for those different styles. I always want to do group projects, but struggle coming up with topics for them and finding the time to squeeze them in among lectures. This coming semester (Spring 2018), I’m going to be incorporating more repetition in key techniques more student writing in homeworks and exams. I also hope to attend at least two conferences in the coming academic year that can help me improve my teaching.

REASEARCH STATEMENT

My research so far has covered three different areas.

The first is statistical in nature. With data supplied by the Missouri Department of Conservations, I have done some statistical analyses on the incidents and outbreaks of hemorrhagic disease (HD) in Missouri's white-tailed deer. Going beyond the typical summary statistics, I have used a program called SaTScan to look for "clusters" where the presence of the disease is statistically significant. These clusters can be significant in geography, in time, or both. The analysis has shown that the disease is most prevalent in the central and southern parts of Missouri and that major outbreaks occur every five to eight years. If this is in fact true, Missouri is due for another major outbreak in the next year or two, and armed with this knowledge, conservationists can take steps to mitigate the damage to the deer population and its surrounding ecosystem.

The second and third areas are in applied mathematics. First, I am adapting a deterministic model to more accurately reflect the dynamics of HD, the deer that the disease affects, and the vectors (biting midges) that spread the virus. This adaptation not only includes a logistic growth scheme, for both species, but more importantly, it also incorporates a variable delay dispersion term. This term attempts to reproduce the deer's seasonal migration and also allows for the time of migration to vary. The model also includes terms to mimic deer harvesting and measures to control midge populations. I am currently analyzing the model to find a basic reproduction number (R_0) and using Matlab to perform numeric simulations to determine parameter values (such as interaction rates and optimal levels of disease-controlling mechanisms) and stable endemic populations.

Once this is completed, I will expand this model by reproducing it into a tessellation of "patches." This will further reflect the migration patterns of deer as they leave one area and migrate into another. Thus, the underlying model will be present in both patches, but this multi-patch model will demonstrate the dynamics of how susceptible and infected deer move and the corresponding effects in the populations they move out of and into.