NEW COLLEAGUE SESSION ABSTRACTS
Dickinson College
6 April 2013

STAFFORD AUDITORIUM

10:50am   Enrique Treviño, Swarthmore College
Title: *The primes that Euler forgot*

Abstract: Let $q_0 = 1$. Supposing that we have defined q_j for all $0 \leq j \leq k$, let q_{k+1} be a prime factor of $1 + \prod_{j=1}^{k} q_j$. As was shown by Euclid over two thousand years ago, $q_1, q_2, q_3, \ldots$ is then an infinite sequence of distinct primes. The sequence $\{q_i\}$ is not unique, since there is flexibility in the choice of the prime q_{k+1} dividing $1 + \prod_{j=1}^{k} q_j$. Mullin suggested studying the two sequences formed by (1) always taking q_{k+1} as small as possible, and (2) always taking q_{k+1} as large as possible. For each of these sequences, he asked whether every prime eventually appears. Recently, Booker showed that the second sequence omits infinitely many primes. We give a completely elementary proof of Booker's result, suitable for presentation in a first course in number theory.

11:10am   Jason M. Graham, University of Scranton
Title: *Challenges in Math Modeling from the Biology and Diseases of the Bone*

Abstract: Recent advances and new problems in the study of the physiology and pathology of the musculoskeletal system have inspired a number of mathematical models for various aspects of the biology of bone and cartilage. Many of the early modeling efforts focus on materials science and biomechanical engineering approaches, particularly with regard to the biology of the bone. However, recent research into the basic biology, and diseases of the bone tend to focus on complex interactions occurring at the cellular level. In this talk we briefly discuss some new approaches to mathematical modeling developed to study the basic biology of bone, and consider the application of the new models to some prominent skeletal diseases.

11:30am   Whitney George, West Chester University
Title: *An Introduction to Contact Topology and Legendrian Knots*

Abstract: A contact manifold is an odd dimensional manifold equipped with a completely non-integrable two plane distribution. In this talk, we will focus on the standard contact structure, $\xi_{std} = \ker(dy - ydx)$, on $\mathbb{R}^3$. This contact manifold is easy to visualize and we can therefore look at knots inside $(\mathbb{R}^3, \xi_{std})$ and try to understand how these knots interact with the two-plane distribution, ξ_{std}. For instance, knots that are everywhere tangent to ξ_{std} are called Legendrian and have three classical invariants: the underlying toplogical knot type, rotation number, and Thurston-Bennquin number. We will define these invariants and understand what they tell us about the Legendrian knot.

11:50am   Yu-Ting Hsu, Penn State Harrisburg

Title: *Estimations of the microorganism concentration using the most probable number method*

Abstract: The most probable number (MPN) method is used to estimate the microorganism concentration in a medium. It is widely used in food-safety risk assessment, drinking water exposure assessment, and MPN-PCR (polymerase chained reaction) assays. One potential problem with the MPN method is the bias introduced by the detection limit of the analytical methods chosen. The MPN procedure predicts a microbial concentration estimate by the combinations of positive/negative responses from replicate analyses of serially diluted samples. Therefore, the built-in bias is the number of bacteria needed in order to show a positive response by the detection method used. The existing MPN matrix used by the United States Environmental Protection Agency (EPA) defines a positive to be one or more indicator bacteria present in the test tube. In this talk, the standard method in the literature will be introduced and an alternative way which corrects the bias caused by the detection limit will be discussed, including the result of a simple simulation which shows the improvement in the estimation.

TOME 115

10:50am   Andrew Cooper, University of Pennsylvania
Title: *Blogging Introductory Real Analysis*

Abstract: Several prominent mathematicians use blogs to disseminate their work–not only to their colleagues and students, but also to the general public. Student blogging has been used for a decade or more in college courses in fields ranging from English literature to anthropology to physics. However, it appears that student blogging as a part of college mathematics courses is rare indeed. This semester (Spring 2013) I am using student blogging as part of an introductory real analysis course at the University of Pennsylvania. This talk will discuss the educational goals of the blogging assignment and assess some of its successes and pitfalls. I will use sample student blog posts and comments to illustrate that a course blog can enhance student understanding. I will also give a peek behind the scenes to show that a course blog need not impose great time or technical burdens on the instructor.

11:10am   Tyrone Washington, Millersville University
Title: *Examining the Nature of Preservice Teachers' Understanding of Inequalities*

Abstract: Details of a study designed to investigate the nature of preservice mathematics teachers understanding of inequalities will be discussed in this presentation. The design of the study was a case study of secondary mathematics education preservice teachers with a focus on their understanding. Five preservice mathematics teachers from a major university in the Southeast United States participated in this study. These preservice teachers were examined prior to their student teaching field experience semester but after completion of coursework. The notion of relational and operational views from Knuth et al. (2006) were adapted and used to analyze preservice teachers responses during semi-structured interviews. Preservice teachers displayed a robust procedural understanding, which involved an ability to apply the procedures necessary for solving inequalities, during pre-student teaching interviews (Rittle-Johnson & Alibali, 1999). At times, their understanding extended beyond an operational view of inequalities and allowed them to consider the relational nature of inequalities (Knuth et al., 2006). This was especially true while discussing the meaning of a solution of an inequality. Preservice teachers displayed some of the same conceptions noted within prior literature (e.g., treating inequalities as equations, believing that solutions of inequalities must be inequalities). There did not appear to be a relationship between a preservice teacher displaying one conception and any other conception. Results from this study seem to indicate that deficiencies in preservice teachers understanding of inequalities need to be addressed within methods courses.

11:30am Marina Skyers, Muhlenberg College
Title: *Central Limit Theorem, Conditional Probability and Frequent Feedback: Ideas for an Introductory Statistics Course*

Abstract: The central limit theorem and conditional probability are some topics that introductory statistics students struggle with most. This talk will provide some strategies for teaching these concepts. I will also discuss strategies for obtaining frequent feedback from the students that won't create extra grading for the instructor.

11:50am   Cynthia E. Taylor, Millersville University
Title: *Examining Elementary Mathematics Teacher Educators' Practices*

Abstract: In the U.S., there is a national debate about how to best prepare future teachers (Boyd et al., 2008; Levine, 2006). This debate has been fueled by claims that teacher education programs do not sufficiently prepare teachers for the classroom (Grossman, 2008). Furthermore, we know little about the practices of university faculty who prepare mathematics teachers, as these practices are not widely studied, documented or disseminated (e.g., Bergsten & Grevholm, 2008). Therefore, the goal of this study is to describe how mathematics teacher educators (MTEs) address the Common Core State Standards for Mathematics (CCSSM) in their teacher education programs. Specifically, we intend to document the instructional strategies MTEs use to enhance students understanding of the mathematical practices and content within the CCSSM. The research questions underlying this study are: 1. What instructional practices do mathematics teacher educators use to provide opportunities for prospective teachers to learn about the CCSSM in their elementary content and methods courses? 2. In what ways do mathematics teacher educators instructional practices influence prospective teachers knowledge of the CCSSM? In this presentation, I will outline a research study I am currently working on that focuses on how MTEs are helping prospective teachers begin the work needed to understand both the new content and mathematical practices standards immediately (Charles, 2012, p. 30) while in their teacher preparation programs.