COLLOQUIUM Fall 2000

Mr. Hollis Duncan

**Graduate student, Department of Science and Math Education,
Oregon State University,
a UTC math graduate**

Wednesday, September 6, Room 204, 2 p.m.

Collaborative Workshops and Student Academic Performance in Introductory College Mathematics Courses: A Study of a Treisman Model Math Excel Program

Abstract. High failure rates in introductory college mathematics courses have been a concern for many years, particularly among underrepresented groups of students. One approach to the problem that has experience some success has been Treisman's Emerging Scholars workshop model. The model involves supplemental workshops where students solve problems in collaborative learning groups. This study reports on the effectiveness of Math Excel, an implementation of the Treisman model for introductory mathematics courses (College Algebra, Precalculus, Differential Calculus and Integral Calculus) at Oregon State over five academic terms. Regression analysis revealed a significant effect on achievement (.671 grades points on the four point scale) favoring Math Excel students. Even after adjusting for prior mathematics achievement using linear regression with SAT-m as predictor, Math Excel students' grades were over half a grade point better than predicted (p¡.001). This study provides evidence that programs like Math Excel can help students in making a successful transition to college mathematics study.

COLLOQUIUM Fall 2000

Professor Michael Kostreva

Department of Mathematical Sciences
Clemson University,

Thursday, October 19, Room 204, 2:00 p.m.

Methods of Feasible Directions for Nonlinear Programming

Abstract. Some recent results related to the classical method of feasible directions will be presented. These include some changes which enhance the performance by decreasing the number of iterations required, and some new ways to find feasible solutions of convex programming problems.

COLLOQUIUM Fall 2000

Professor Ian Knowles

Department of Mathematics

University of Alabama at Birmingham,

Thursday, October 26, Room 204, 2:30 p.m.

DESCENT METHODS for INVERSE PROBLEMS

Abstract. Complex physical processes are often represented mathematically by systems of linear ordinary or partial differential equations. A crucial part of this modeling process involves the determination of all of the coefficient functions in the various differential equations. In many situations of practical interest it is, for various reasons, impractical to measure these functions directly. In groundwater modeling, for example, one cannot easily measure most subsurface parameters; in subatomic modeling, potential functions cannot be measured directly , and in medical imaging, one is always trying to infer internal properties "non-invasively". On the other hand, it is generally true that one can make reasonably accurate measurements of the effects of a particular physical process. For example, in groundwater flow, one can measure the height (head) of water, over time, in a grid of wells; particle physicists can measure spectra, and scattering data; in electrical impedance tomography, one can apply currents at the surface of a body and measure the resulting surface voltages. Mathematically, in each of these examples one is given data on the solution of a differential equation with the intent of using this data to estimate the coefficient functions. This is the essence of an inverse problem. While the "forward" problems are generally linear and well-posed, the inverse problems are invariably highly nonlinear and ill-posed. In this lecture we discuss a general approach to parameter estimation inverse problems in which the coefficients in question are computed as the unique global minima of certain non-negative functionals that also tend to have unique critical points.

COLLOQUIUM Fall 2000

Professor Miroslav Bartušek

Department of Mathematics

Masaryk University Brno, Czech Republic

Tuesday, October 31 , Room 204, 2:45 p.m.

On Existence of Black Hole Solutions

Abstract. Consider the nonlinear differential equation of the n-th order

$$y^{(n)} = r(t)f(y, y', \dots, y^{(n-1)}), \quad (1)$$

where $r \in L_{\mathrm{loc}}(R_+)$, f is continuous on R^n and f fulfills the sign condition. A solution $y : [0, a) \to R$, $a < \infty$ is called singular if $\limsup_{t\to a} |y^{(n-1)}(t)| = \infty$. Sufficient and necessary conditions are given under which (1) has a singular solution y fulfilling $\lim_{t\to a_-} y^{(i)}(t) = c_i$, $i = 0, 1, \dots, n-2$, $\lim_{t\to a_-} |y^{(n-1)}(t)| = \infty$ with $c_i \in R$. Such solutions are called black hole solutions.

COLLOQUIUM Fall 2000

Boris Belinskiy

Department of Mathematics, UTC

Thursday, November 30, Room 204, 2:45 p.m.

The Problems of Control, Optimal Design, and Random Oscillations for some Engineering Models

Abstract. This talk is supposed to be considered as the report on the CECA Scholars Grant **The Problems of Control, Optimal Design, and Random Oscillations for some Engineering Models** (Fall 1999 - Summer 2000). The following topics will be briefly discussed.

1. EXACT CONTROLLABILITY OF A HANGING CABLE (with M.A. Shubov, Texas Tech).
2. OPTIMAL CONTROL OF THE ROTATING STRING (with S. Lenhart, UTK).
3. OPTIMAL DESIGN OF A TURBINE (with C.M. McCarthy, Murray State University, KY)
4. RANDOM OSCILLATIONS of MECHANICAL SYSTEMS (with P. Caithamer, UTC).
5. SOME GENERAL PROPERTIES of the SOLUTIONS for HELMHOLTZ EQUATION (with I. V. Andronov, St. Petersburg Univ., Russia).
6. HEAT TRANSFER PROBLEMS (with J. Hiestand, UTC).
7. EXPONENTIAL MIXTURE REPRESENTATION of GEOMETRIC STABLE DENSITIES (with T. J. Kozubowski, UTC).
8. WAVE PROPAGATION in the ICE-COVERED OCEAN WAVE GUIDE and OPERATOR POLYNOMIALS.
9. CROSS PRODUCT in the MULTIDIMENSIONAL SPACE (with A. Oloko, UTC).

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A Panel Discussion for Students and Faculty

Tuesday, January 23, Room 204, 2:00 p.m.

On the Experience of Math Majors Working in Business

Abstract. Irene Loomis and Jerald Dauer have organized this panel discussion for the department faculty and students. The panel members will be two of our recent graduates, Joe Franklin and Len Cooper. Joe is Vice President of Investments at Hilliard Lyons and Len is at Provident. A reception with refreshments will follow the panel discussion.

Professor Betsy Darken

Department of Mathematics
University of Tennessee at Chattanooga,

Thursday, February 15, Room 204, 2:30 p.m.

Beyond 2 + 3: What Future American K-8 Teachers Need to Know About Not-So-Elementary Mathematics

Abstract. Research has shown that, unlike teachers in other countries, American mathematics teachers teach mostly facts and procedures, and understand little beyond what they teach. This talk presents materials for a college course for future teachers that have proved successful in raising students' conceptual understanding of elementary mathematics while guaranteeing proficiency with basic skills.

Dr. David Ashe

Department of Discrete and Statistical Sciences

Auburn University

Friday, February 23, Room 207, 3:00 p.m.

Partial 6-Cycle Systems with any Specified Forest or 2-Regular Leave

Abstract. We find necessary and sufficient conditions for the existence of a 6-cycle system of $K_n - E(F)$ for any spanning forest F and $K_n - E(R)$ for any 2-regular subgraph R of the complete graph K_n.

Dr. Ashe is a candidate for the position in our Department.

Five Math Faculty

Department of Mathematics
UTC

Tuesday, February 27, Room 155 (next to Math Lab), 3:00p.m.

Ask the Professors

Abstract.
Five faculty members from the mathematics department will participate in an informal panel discussion of subjects that will be of interest to mathematics majors. Come and bring your questions (no rotten tomatoes) and help us make your UTC experience a more enlightened one.

Refreshments will be served!!

Dr. Shamita Dutta Gupta

Department of Mathematics

Florida International University

Monday, March 5, Room 212, 3:15 p.m.

Taxicabs, Sums of Cubes and L-Series

Abstract. A line intersects a cubic curve at 3 points. Related to this fact, we will address some topics of classical and modern number theory.

Dr. Gupta is a candidate for the position in our Department.

Dr. Xiaotie She

New York Life Insurance Company

Monday, March 5, Room 212, 2:00 p.m.

On the Ranks of the Mordell-Weil Groups

Abstract. We will talk about the automorphic forms, Rankin-Selberg method and its applications to arithmetic of the elliptic curves. In particular, we will discuss the ranks of the Mordell-Weil groups of an elliptic curve under the cubic base field extension.

Dr. She is a candidate for the position in our Department.

Professor Charles R. Johnson

College of William and Mary

Monday, March 26, Room 212, 3:00 p.m.

Entry-wise Nonnegative Matrices: History and Applications

Abstract. Square matrices with nonnegative entries were a central theme of research in matrix theory throughout the twentieth century, both because of their natural in many applications and their theoretical place as a generalization of the notion of nonnegative number to matrices. Some of the basic ideas, dating back to the work of Perron and Frobenius in the early part of the century are surveyed, along with several modern applications and open problems.

This talk will be suitable for undergraduate students who have had a bit of linear algebra. Professor Johnson is going to pattern it after a talk he was asked to give for Students in Zaragoza, Spain for the International Year of Mathematics.

Stephen Kuhn, Edward Rozema, and Terry Walters

Math Department, UTC

Thursday, March 29, Metro 205, 1:45pm.

Computer Projects in UTC Calculus Courses

Abstract. For the last two years we have had separate 1 hour lab courses, Math 152 and Math 162, to complement our 3 hour lecture courses in Calculus. Each week students attend a two hour session held in a computer lab during which they work on projects, each of one or two weeks duration. Each project consist of a tutorial on a calculus topic and the associated assignment for the students to complete. These projects all use a software application called Maple. Both parts of each project are in the form of Maple worksheets which have been prepared by faculty members in the Mathematics Department. Topics in Math 152 and 162 have been chosen to use Maple's excellent graphing capability, as well as its ability to compute numerically and symbolically, and to differentiate and integrate symbolically. In this colloquium we give an overview of what the faculty and students do in these courses, how and why we do it, and how these courses relate to the lecture courses. Attendees will have the opportunity to work their way through a sample of current projects from both courses.

This talk will be suitable for all mathematics faculty and for faculty in other departments which require their students to take these courses.

Judy Y. Phillips

Centers for Disease Control and Prevention(CDC)

Thursday, April 12, Metro 205, 2pm.

CDC and the employment opportunities there

Abstract. The speaker will give an overview of the CDC and discuss some of the employment opportunities at the CDC.