

# Algebra Session Info: Centennial Celebration

## Conference Schedule

This page will be updated (to include times and locations of talks, for example, along with anything else that may be relevant to the Algebra Special Session) as more information becomes available. If you are a speaker and would like additional information listed (such as for example your talk's title or abstract, or perhaps an email address or link to a web page of your own), contact me with the additional information at the address below.

The Algebra Special Sessions will all be held in Burnett 125, which has two walls of blackboards, one wall of white boards, a suspended video monitor with a VCR, and an overhead projector with a screen. I do not know if this room has an internet connection; let me know if I should find out.

### • THURSDAY MAY 14

- Reception, Sheldon Art Gallery, 6-9 PM, (hors d'oeuvres at 7:00 PM)

### • FRIDAY MAY 15

- Registration Beginning at 8:00AM in 107 Burnett Hall
- 8:45 Welcome, 115 Burnett Hall
- 9:00 -9:55 115 Burnett Hall PLENARY ADDRESS, Mel Thornton, UN-L
  - Mathematics Education, Innovation and Outreach: Where we've been and where we're going
- 10:00- 10:25 Break, Coffee and Snacks in 107 Burnett
- 10:30 - 12:30 Burnett Special Sessions
  - Burnett 103 Special Session on Combinatorics, I
  - Burnett 124 Special Session on Difference and Differential Equations, I
  - Burnett 120 Special Session on Feynman and Wiener Integrals, I
  - Burnett 119 Special Session on Mathematics Education, I
  - Burnett 118 Special Session on Mathematics Outside Academia, I
  - Burnett 121 Special Session on Operator Algebras, I
  - Burnett 102 Special Session on Recreational and General Interest Mathematics, I
  - **Burnett 125 Special Session on Ring Theory and Algebraic Geometry, I**
    - 10:30 - 10:50 **Betty Jean Harmsen**, Dana College: **Connections Between Difference Equations and Algebraic Geometry**
      - **Abstract:** To use finite differences in approximating the solution of a

boundary value problem, we replace the differential quotients with difference quotients and rewrite the resulting difference equation as a system of equations. If this system is nonlinear, the method of Groebner bases, discovered in the 1960s, can be used. Considerable research has been done on applications of Groeber bases to computer aided geometric design, complex informations systems, integer programming, and coding theory. Little work has been done, however, on their application to boundary value problems. The purpose of this talk is to provide an elementary introduction to Groeber bases and to give examples of the use of Groebner bases in approximating solutions to non-linear boundary value problems.

- 11:00 - 11:20
- 11:30 - 11:50 **Dave Jorgensen**, UT-Austin: **Intersection multiplicity and homological algebra**
  - **Abstract:** A classical problem in algebraic geometry is to define intersection multiplicity for the intersection of two projective varieties (in hopes to facilitate a generalized Bezout's theorem). The most compact and recent definition was introduced by Serre in 1957. Serre showed that his definition was satisfactory in certain cases. We will discuss recent results and developments regarding the applicability of this definition of Serre's, and the role played by homological algebra.
- 12:00 - 12:20
  - Bessey 117 Special Session on Semigroup Theory, I
  - Burnett 115 Special Session on Statistics, I
- 12:30-2:00 Lunch
- 2:00 - 2:55 115 Burnett Hall PLENARY ADDRESS, Mark Teply, University of Wisconsin-Milwaukee
  - Algebra at Nebraska
- 3:00- 3:25 Break, Coffee and Snacks in 107 Burnett
- 3:30- 5:30 Special Sessions
  - Burnett 103 Special Session on Combinatorics, II
  - Burnett 124 Special Session on Difference and Differential Equations, II
  - Burnett 120 Special Session on Feynman and Wiener Integrals, II
  - Burnett 119 Special Session on Mathematics Education, II
  - Burnett 118 Special Session on Mathematics Outside Academia, II
  - Burnett 121 Special Session on Operator Algebras, II
  - Burnett 102 Special Session on Recreational and General Interest Mathematics, II
  - **Burnett 125 Special Session on Ring Theory and Algebraic Geometry, II**
    - 3:30 - 3:50 **Susan Loopp**, Williams College: **Integral Domains with Local Generic Formal Fibers**
      - **Abstract:** Let  $(T,M)$  be a complete local ring and  $p$  a prime ideal of  $T$ . Under what conditions is there a local domain  $A$  such that the completion of  $A$  is  $T$  and such that the generic formal fiber of  $A$  is local with maximal ideal  $p$ ? While we cannot yet completely answer this question, we have made progress. In this talk, I will present results from my work and from the Senior Honors

Thesis of Deborah Greilsheimer, a Williams College 1997 graduate.

- 4:00 - 4:20
- 4:30 - 5:20 **Dale Cutkosky**, Univ. Missouri-Columbia: **Local monomialization and factorization of morphisms**
  - **Abstract:** We prove that generically finite morphisms  $X \rightarrow Y$  of varieties over a field of characteristic zero can be locally monomialized. That is, given a fixed valuation of the function field of  $X$ , there exist sequences of monoidal transforms (blow ups of nonsingular subvarieties)  $X_1 \rightarrow X$  and  $Y_1 \rightarrow Y$  such that  $X_1 \rightarrow Y_1$  is a morphism, and  $X_1 \rightarrow Y_1$  is a monomial mapping at the center of  $V$ .

We use our monomialization theorem to prove local factorization of birational morphisms. Suppose that  $X \rightarrow Y$  is a birational morphism of varieties, over a field of characteristic zero. Given a fixed valuation of the function field of  $X$ , we prove that there exist sequences of monoidal transforms (blow ups of nonsingular subvarieties)  $X_1 \rightarrow X$  and  $Y_1 \rightarrow Y$  such that  $X_1 \rightarrow Y_1$  is a morphism, and  $X_1 = Y_1$  at the center of  $V$ . This proves a conjecture of Abhyankar.

- Bessey 117 Special Session on Semigroup Theory, II
- Burnett 115 Special Session on Statistics, II
- 3:30-4:30 Campus Tour, Meet at 106 Burnett Hall
- 6:00--6:45 Cash Bar, Cornhusker Hotel
- 6:45-7:00 PM Group Photograph at Cornhusker Hotel
- 7:00-10:00 PM Banquet at Cornhusker Hotel

## • SATURDAY MAY 16

- 9:00 -9:55 115 Burnett Hall PLENARY ADDRESS, Frank Gilfeather, University of New Mexico,
  - Mathematics, Universities, and the Federal Government: Issues facing the profession in the 21st Century
- 10:00- 10:25 Break, Coffee and Snacks in 107 Burnett
- 10:30 - 12:30 Burnett Special Sessions
  - Burnett 103 Special Session on Combinatorics, III
  - Burnett 124 Special Session on Difference and Differential Equations, III
  - Burnett 120 Special Session on Feynman and Wiener Integrals, III
  - Burnett 119 Special Session on Mathematics Education, III
  - Burnett 121 Special Session on Operator Algebras, III
  - Burnett 102 Special Session on Recreational and General Interest Mathematics, III
  - **Burnett 125 Special Session on Ring Theory and Algebraic Geometry, III**

- 10:30 - 10:50 **Aihua Li**, Loyola Univ.: **Height-one Prime Ideals of Birational Extensions of A Noetherian UFD**
- 11:00 - 11:20 **Graham Lueschke**, UNL: **Gorenstein modules and rings of finite Cohen-Macaulay type**
- 11:30 - 11:50 **Kurt Herzinger**, West Texas A&M Univ.: **Numerical semigroups, symmetry and torsion in tensor products**
  - **Abstract:** Let  $R$  be a commutative one-dimensional Noetherian local domain. Assume that the integral closure of  $R$  is a d.v.r. with the same residue field as  $R$ . Let  $I$  be a non-principal fractional ideal of  $R$  and let  $I^*$  denote the dual of  $I$ . We can investigate torsion in the tensor product of  $I$  with  $RI^*$  by looking at the size of minimal generating sets for  $I$ ,  $I^*$  and  $II^*$ . These minimal generating sets can be investigated using numerical semigroups and relative ideals. The talk will be a survey of the results pertaining to torsion using numerical semigroup methods. We will also look at current research and conjectures in this area.
- 12:00 - 12:20 **Serpil Saydam**, UNL: **Prime ideals in Noetherian rings**
  - **Abstract:** We consider the set of prime ideals of a commutative ring  $R$  as a partially ordered set under inclusion. In particular we study this partially ordered set for rings close to the ring of polynomials over the integers.
- Burnett 126 Special Session on Semigroup Theory, III
  - 10:30-12:00 Tour of Downtown Lincoln, Meet at 106 Burnett
  - 12:30-2:00 Lunch
  - 2:00 - 2:55 115 Burnett Hall, PLENARY ADDRESS, Johnny Henderson, Auburn University
    - Differential Equations at Nebraska
  - 3:00- 3:25 Break, Coffee and Snacks in 107 Burnett
  - 3:30- 5:30 Special Sessions
    - Burnett 124 Special Session on Difference and Differential Equations, IV
    - Burnett 120 Special Session on Feynman and Wiener Integrals, IV
    - Burnett 119 Special Session on Mathematics Education, IV
    - **Burnett 125 Special Session on Ring Theory and Algebraic Geometry, IV**
      - 3:30 - 4:30 See Panel Discussion below
      - 4:30 - 4:50 **Joe Brennan**, No Dak St Univ.: **Integral Closure, Toric Varieties and Integer Programming**
        - **Abstract:** Recent results of Conti and Traverso have led to solutions of integer programming problems through use of the Buchsberger algorithm. This talk will focus on the connections with toric varieties and computations of normalizations.
      - 5:00 - 5:20
- 3:30 -4:30 115 Burnett Hall PANEL DISCUSSION: Graduate life in the department in the 60's, 70's 80's and 90's.

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