INFO SHEET

March 29, 2011

QUEEN'S UNIVERSITY AT KINGSTON
Department of Mathematics and Statistics
http://www.mast.queensu.ca

CALENDAR		
Wednesday, March 30	**Curves Seminar** **Time: 4:00 p.m. – 5:30 p.m.** **Place: Jeffery 319**	**Speaker:** Victor Lozovanu and Mike Roth **Title:** Syzygies of algebraic varieties VI **Abstract Attached**
Thursday, March 31	**Math Club** **Time: 5:30 p.m. – 6:30 p.m.** **Place: Jeffery 118**	**Speaker:** M. Ram Murty **Title:** Waring's Problem **Abstract Attached**
Friday, April 1	**Number Theory Seminar** **Time: 11:30 a.m. – 12:20 p.m.** **Place: Jeffery 422**	**Speaker:** Adrian Muresan, Queen's University **Title:** Galibraith's Algorithm for Computing Isogenies Between Elliptic Curves on Finite Fields **Abstract Attached**
Friday, April 1	**Department Colloquium** **Time: 2:30 p.m. – 3:30 p.m.** **Place: Jeffery 234**	**Speaker:** Serdar Yüksel, Queen's University **Title:** Characterization of information channels for stochastic stabilizability of unstable systems **Abstract Attached**
Monday, April 4	**Algebraic Geometry Seminar** **Time: 4:30 p.m. – 5:30 p.m.** **Place: Jeffery 319**	**Speaker:** Jerzy Weyman, Northeastern University **Title:** The Structure of the Resolutions of Length Three **Abstract Attached**
Thursday, April 7	**Conference Room** **Time: 10:00 a.m.** **Place: Jeffery 521**	**Ph.D. Oral Student:** Adam Felix **Title:** Variations on Artin's Primitive Root Conjecture **Supervisor:** R. Murty
Friday, April 15	**Conference Room** **Time: 9:30 a.m.** **Place: Jeffery 521**	**Ph.D. Oral Student:** Shan Jiang **Title:** Statistical Inference for the Treatment Effect in Cancer Clinical Trials **Supervisor:** D. Tu

Items for the Info Sheet should reach Anne (burnsa@mast.queensu.ca) by noon on Monday. The Info Sheet is published every Tuesday.

Wednesday, March 30, 4:00 p.m. Jeffery 319 **Curves Seminar**
Speaker: Victor Lozovanu and Mike Roth
Title: Syzygies of algebraic varieties

Abstract: We will continue with the dictonary between graded modules and sheaves, this time concentrating -------- on passing from modules to sheaves. After giving a few applications (including Noether's AF+BG theorem), we will then start to discuss Castelnuovo-Mumford regularity.

Thursday, March 31, 5:30 p.m. Jeffery 118 **Math Club**
Speaker: M. Ram Murty
Title: Waring's Problem

Abstract: Inspired by Lagrange's 1770 theorem that every natural number can be written as a sum of four squares, Edmund Waring conjectured that every natural number can be written as a sum of nine cubes, nineteen fourth powers and so on. This came to be known as Waring's problem and has inspired many new methods in number theory, algebra and analysis.

Waring's problem was first solved in 1909 by David Hilbert, more than a century after it was posed. Still, there are many open questions regarding it. We will survey the history of the problem, and explain an elementary approach to solving it. If time permits, we will indicate a few related unsolved problems.

Friday, April 1, 11:30 a.m. Jeffery 422 **Number Theory Seminar**
Speaker: Adrian Muresan
Title: Galibraith's Algorithm for Computing Isogenies between Elliptic Curves on Finite Fields

Abstract: It is known that two elliptic curves over a finite field are isogenous if and only if they have the same number of points over that field (theorem due to Tate). The proof of Tate's theorem is, unfortunately, highly abstract and there is no way presented as to how one would go about constructing the isogeny. This talk will outline and discuss the algorithm that Galibraith put forth to achieve this task.

Friday, April 1, 2:30 p.m. Jeffery 234 **Department Colloquium**
Speaker: Serdar Yüksel
Title: Characterization of information channels for stochastic stabilizability of unstable systems

Abstract: We consider stabilization of controlled linear systems over communication channels. Stable sources, and unstable but noise-free systems have been extensively studied in information theory and control theory literature since 1970s, with a renewed interest in the past decade. In this talk, we present (tight) necessary and sufficient conditions for stochastic stabilizability of unstable (non-stationary) linear systems driven by Gaussian noise, over discrete noisy channels. Stochastic stability notions include recurrence, asymptotic mean stationarity and sample path ergodicity, and the existence of finite second moments. We review some older and present new results on stochastic stabilization of Markov chains under state-dependent drift criteria, which are used for the constructive/achievability proofs. For asymptotic mean stationarity and sample path ergodicity, we show that it is necessary and sufficient that the capacity of a channel is (strictly) greater than the sum of the logarithms of the unstable pole magnitudes for noisy memoryless channels and a class of channels with memory. We provide sufficiency conditions on channel reliabilities for the existence of finite average second moments.

Monday, April 4, 4:30 p.m. Jeffery 319 **Algebraic Geometry Seminar**
Speaker: Jerzy Weyman
Title: The Structure of the Resolutions of Length Three

Abstract: Let us recall that for a given format (r_n,\ldots ,r_1) of the free complex 0 --> F_n --> F_{n-1} --> \ldots --> F_0 over a commutative ring with the rank of the i-th differential d_i equal to r_i (and thus rank F_i =r_r+r_{i+1}), we say that an acyclic complex F_{gen} over a given ring R_{gen} is generic if for every complex G of this format over a Noetherian ring S there exists a homomorphism f : R_{gen} --> S such that G = F_{gen} \otimes_{R_{gen}} S.

For complexes length 2 the existence of the generic acyclic complex was established by Hochster and Huneke in the 1980's. It is a normalization of the ring giving a generic complex (two matrices with composition zero and rank conditions).

I prove the following result: Associate to a triple of ranks (r_3, r_2, r_1) a triple (p,q,r)=(r_3+1, r_2-1, r_1+1). Associate to (p,q,r) the graph T_{p,q,r} (three arms of lenghts p-1, q-1, r-1 attached to the central vertex). Then there exists a Noetherian generic ring for this format if and only if T_{p,q,r} is a Dynkin graph. In other cases one can construct in a uniform way a non-Noetherian generic ring, which carries an action of the corresponding Kac-Moody Lie algebra.