BRÅKET

Information om seminarier och högre undervisning i matematiska ämnen i Stockholmsområdet

NR 40 **FREDAGEN DEN 10 DECEMBER 2004**

BRÅKET

Veckobladet från Institutionen för matematik vid Kungl Tekniska Högskolan och Matematiska institutionen vid Stockholms universitet

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Sista manustid för nästa nummer:
Torsdagen den 13 januari kl. 13.00.

Lucia-konferens i Algebraisk Geometri

Denna äger rum vid KTH den 13 – 14 december 2004. Se sidorna 4 – 5.

God Jul och Gott Nytt År

önskas Bråkets läsare. Nästa nummer av Bråket utkommer fredagen den 14 januari 2005.

SEMINARIER

Fr 12 – 10 kl. 10.00 – 12.00. Högre seminarium i språkfilosofi och logik. Peter Pagin: *Indeterminacy and the analytic/synthetic distinction: a brief survey.* Rum D700, Filosofiska institutionen, SU.

Fr 12 – 10 kl. 15.15. Licentiatseminarium i matematik. Sonja Čukić presenterar sin licentiatavhandling: *Topological Properties of Complexes of Graph Homomorphisms.* Opponent: **Professor Rade Živaljević.** Seminarierum 3721, Institutionen för matematik, KTH, Lindstedtsvägen 25, plan 7. Se Bråket nr 39 sidan 6.

Fortsättning på nästa sida.

Disputation i matematisk statistik

Fredrik Armerin disputerar på avhandlingen *Aspects of Cash Flow Valuation* fredagen den 10 december kl. 10.00 i sal E1, KTH, Lindstedtsvägen 3, b.v. Se Bråket nr 38 sidan 3.

Disputation i matematik/tillämpad matematik

Paul Lankinen disputerar på avhandlingen *Spinors, Clifford algebras and superenergy tensors* fredagen den 17 december kl. 10.15 i sal Gamma, hus U, Mälardalens högskola, Högskoleplan, Västerås. Se Bråket nr 39 sidan 5.

Disputation i numerisk analys

Malin Siklosi disputerar vid KTH på avhandlingen *Aspects of Viscous Shocks* fredagen den 17 december kl. 14.00. Se sidan 9.

Kurser

Jens Hoppe: Elementär differentialgeometri. Se sidan 11.

Serguei Shimorin: An invitation to spectral function theory. Se sidan 7.

Rolf Sundberg: Statistics for microarrays. Se sidan 10.

Seminarier (fortsättning)

Må 12–13 kl. 15.15 – 17.00. Seminarium i matematisk statistik. Filip Lindskog: *Functional large deviations for multivariate regularly varying random walks.* Seminarierum 3733, Institutionen för matematik, KTH, Lindstedtsvägen 25, plan 7. Se Bråket nr 39 sidan 5.

Må 12–13 kl. 15.45. Kollokvium i fysik. *(Observera dagen och tiden!)* **Professor Frank Wilczek,** MIT, Nobelpristagare i fysik 2004: *The universe is a strange place.* Oskar Kleins auditorium, Roslagstullsbacken 21, AlbaNova universitetscentrum.

Ti 12–14 kl. 10.15. Plurikomplexa seminariet. Marcus Sundhäll, Göteborg: *Schatten-von Neumann properties of bilinear Hankel forms of higher weights and some related matrix-valued Bergman projections.* Sal MIC 2215, Matematiska institutionen, Polacksbacken, Uppsala universitet. Se sidan 6.

Ti 12–14 kl. 13.15. Plurikomplexa seminariet. Christer Kiselman, Uppsala: *Monodiffric functions.* Sal MIC 2215, Matematiska institutionen, Polacksbacken, Uppsala universitet. Se sidan 6.

Ti 12–14 kl. 14.00 – 15.00. Mittag-Leffler Seminar. Ilze Ziedins, University of Auckland: *Routing in parallel tandem queues with loss: individual and socially optimal policies.* Institut Mittag-Leffler, Auravägen 17, Djursholm.

Ti 12–14 kl. 14.00 – 16.00. Seminar in Statistical Genetics and Bioinformatics. Ph. D. Mark Iles, Institutionen för medicinsk epidemiologi och biostatistik, Karolinska Institutet: *Marker selection for genetic association studies.* Rum 306 (Cramérrummet), hus 6, Matematiska institutionen, SU, Kräftriket. Se Bråket nr 39 sidan 7.

Ti 12–14 kl. 15.30 – 16.30. Mittag-Leffler Seminar. Anders Martin-Löf, SU: *Bose-Einstein condensation in queueing networks.* Institut Mittag-Leffler, Auravägen 17, Djursholm.

On 12–15 kl. 10.15 – 12.00. Kombinatorikseminarium. Faina I. Solov'eva, Novosibirsk: *On transitive codes.* **Sergey Avgustinovich,** Novosibirsk: *Cartesian products of graphs and metric spaces.* Seminarierum 3733, Institutionen för matematik, KTH, Lindstedtsvägen 25, plan 7. Se sidan 3.

On 12–15 kl. 13.00. Seminarium i statistik. Mathias Villani: *Bayesiansk statistik III.* (Fortsättning från seminariet den 1 december.) Sal B705, Statistiska institutionen, SU, Universitetsvägen 10B, plan 7, Frescati.

On 12–15 kl. 13.15 – 14.15. Seminarium i analys och dynamiska system. Mikael Passare, SU: *Title to be announced.* Seminarierum 3721, Institutionen för matematik, KTH, Lindstedtsvägen 25, plan 7.

On 12–15 kl. 13.15 – 14.15. Algebraseminarium. Dan Laksov: *En determinantformel for ytre produkter av en polynomring.* Seminarierum 3733, Institutionen för matematik, KTH, Lindstedtsvägen 25, plan 7. Se sidan 7.

On 12–15 kl. 14.15 – 15.00. Seminarium i numerisk analys. *(Observera dagen!)* **Professor Smadar Karni,** University of Michigan, USA: *Source linearization for inhomogeneous conservation laws.* Rum 4523, Nada, KTH, Lindstedtsvägen 5, plan 5. Se sidan 8.

Professor Karni är fakultetsopponent vid Malin Siklosis disputation. Se sidan 9.

Fortsättning på nästa sida.

Seminarier (fortsättning)

On 12–15 kl. 15.30 – 16.30. Kollokvium. Carel Faber: *On the geometry of the moduli space of curves.* Seminarierum 3721, Institutionen för matematik, KTH, Lindstedtsvägen 25, plan 7. Se sidan 7.

To 12–16 kl. 14.00 – 16.00. Kollokvium i filosofi. Jesse Prinz, University of North Carolina, Chapel Hill, USA: *The perceptual basis of concepts.* Rum D255, Filosofiska institutionen, SU.

To 12–16 kl. 14.15 – 15.00. Seminarium i numerisk analys. *(Observera dagen!)* **Anders Logg,** Toyota Technological Institute, Chicago: *A compiler for variational forms.* Rum 4523, Nada, KTH, Lindstedtsvägen 5, plan 5. Se Bråket nr 39 sidan 4.

Må 12–20 kl. 14.00 – 15.00. Presentation av examensarbete i matematik. Patrik Friggebo: *Algebraiska olikheter.* Sal 16, hus 5, Matematiska institutionen, SU, Kräftriket. Se sidan 6.

Ti 12–21 kl. 14.00 – 16.00. Seminar in Statistical Genetics and Bioinformatics. Professor Juni Palmgren, Inst. för matematisk statistik, SU, och Inst. för medicinsk epidemiologi och biostatistik, Karolinska Institutet: *Elements of statistical learning: Data mining, inference and prediction.* Rum 306 (Cramérrummet), hus 6, Matematiska institutionen, SU, Kräftriket. Se sidan 8.

On 12–22 kl. 13.00. Seminarium i statistik: *Julnötter. Var och en klurar ut sin egen julnöt.* Sal B705, Statistiska institutionen, SU, Universitetsvägen 10B, plan 7, Frescati.

KOMBINATORIKSEMINARIUM

Faina I. Solov'eva: On transitive codes

Abstract: Transitive objects play an important role in coding theory, combinatorics, graph theory and group theory. Applying some well-known constructions (Vasil'ev's, Plotkin's and Mollard's) to known binary transitive codes of some lengths, it is possible to get infinite classes of transitive binary codes of greater lengths.

Sergey Avgustinovich: Cartesian products of graphs and metric spaces

Abstract: We prove uniqueness of decomposition of a finite metric space into a product of metric spaces for a wide class of product operations. In particular, this gives a positive answer to the long-standing question of S. Ulam, "If $U \times U \simeq V \times V$ with U, V compact metric spaces, will then U and V be isometric?" in the case of finite metric spaces.

In the proof we use the uniqueness of Cartesian decomposition of connected graphs; a known fact to which we give a new proof which is shorter and more transparent than existing ones.

This is joint work with D. Fon-Der-Flaass.

Tid och plats: Onsdagen den 15 december kl. 10.15 – 12.00 i seminarierum 3733, Institutionen för matematik, KTH, Lindstedtsvägen 25, plan 7.

LUCIA-KONFERENS I ALGEBRAISK GEOMETRI

Måndagen den 13 och tisdagen den 14 december 2004 kommer vi att organisera en liten konferens i Algebraisk Geometri, finansierad med hjälp av ett anslag från Göran-Gustafsson-Stiftelsen.

Konferensen är organiserad av Carel Faber och Dan Laksov.

K. Ranestads föredrag den 13 december kl. 11.15 – 12.15 äger rum i seminarierum 3733. De övriga föredragen äger rum i seminarierum 3721. Båda seminarierummen har adressen Institutionen för matematik, KTH, Lindstedtsvägen 25, plan 7.

Programmet för konferensen är följande:

Måndagen den 13 december

10.45 Kaffe/te i köket utanför lilla seminarierummet 3733.

11.15 – 12.15 **K. Ranestad,** Oslo: *Schubert unions in Grassmann varieties.*
Abstract: I will report on recent work with Johan P. Hansen and Trygve Johnsen concerning the question: Consider a Grassmann variety $G(k,n)$ defined over a finite field F_q in its Plucker embedding, and fix a dimension d between 0 and the dimension of the Plucker space. What is the maximal number of F_q-points in the intersection of a linear subspace of dimension d and $G(k,n)$? Unions of Schubert varieties appear as linear sections of $G(k,n)$ and are natural candidates for this maximality. An answer to the question computes the higher weights of linear Grassmann codes.

Lunch.

14.00 – 15.00 **T. Ekedahl,** Stockholm: *The p-deformation of Schubert cycles.*
Abstract: Considerations of the so-called EO-stratification of the moduli space of abelian varieties and an associated moduli space in positive characteristic p have revealed the existence of a "deformation" of the classes in the cohomology of the appropriate (symplectic) flag spaces of the Schubert varieties. The classical case appears as the limit when the characteristic is put equal to 0. I shall give a description of the purely algebraic setup that gives such a deformation.

Lucia-firande i pausrummet, plan 4.

15.45 – 16.35 **S. Lekaus,** Essen: *Unipotent flat bundles and Higgs bundles over compact Kähler manifolds.*
Abstract: In this talk I will characterize those unipotent representations of the fundamental group $\pi_1(X,x)$ of a compact Kähler manifold X, which correspond to a Higgs bundle whose underlying Higgs field is equal to zero. The characterization is parallel to the one that R. Hain gave of those unipotent representations of $\pi_1(X,x)$ that can be realized as the monodromy of a flat connection on the holomorphically trivial vector bundle.

16.45 – 17.35 **D. Rydh,** Göteborg: *Weak variants of flatness.*
Abstract: The talk will revolve around properties of morphisms that are weaker than flatness. Well-known examples are *universally open* morphisms and morphisms locally of *finite* Tor-*dimension.* Some of these properties can be described by valuative criterions similar to that of flatness and some will resemble *seminormality.* All the properties I will discuss have evolved from the study of families of cycles.

19.00 Middag i Blå Porten, Djurgårdsvägen 64.

(Fortsättning på nästa sida.)

Tisdagen den 14 december

9.45 Kaffe/te utanför stora seminarierummet 3721.

10.00 – 11.00 **P. Salberger,** Göteborg: *Counting rational points on projective varieties.*
Abstract: Let X be a projective variety of degree > 1 defined over Q and $N(X, B)$ be the number of rational points of height at most B on X. Let $a(X) = \limsup \log N(X, B)/\log B$ when B goes to infinity. We shall present a proof of a conjecture a Heath-Brown that $a(X)$ cannot exceed the dimension of X. This is best possible since $a(X) = \dim X$ when X contains a linear subspace of codimension one.

11.15 – 12.15 **A. L. Knutsen,** Oslo: *Extendability of surfaces and a genus bound for Enriques-Fano threefolds.*
Abstract: In this talk I will present a general result giving a sufficient condition for a surface not to be extendable, i.e. not to appear as a hyperplane section of a (possibly singular) threefold other than a cone. The conditions involve the existence of a family of curves on the surface having the property that certain Gauss maps and multiplication maps of line bundles on them are surjective.
I will give some applications of the result in the case of pluricanonical surfaces and surfaces embedded by an adjoint line bundle, and moreover to the open question of classifying Enriques-Fano threefolds (that is a threefold having a hyperplane section that is an Enriques surface). These were claimed classified by Fano in 1938, but his proof contains many gaps, which to this day have only been filled out under certain assumptions on the singularities (e.g. normal). Our procedure yields the genus bound $g \leq 18$ for such threefolds, with no assumptions on their singularities (the genus is by definition the genus of any smooth curve section).
The work is joint with A. Lopez and R. Muñoz.

Lunch.

14.00 – 14.50 **H. Maakestad,** Stockholm: *Principal parts and invariants for coherent O-modules.*
Abstract: I will discuss the bimodules of principal parts and fundamental exact sequences of principal parts and their relations to invariants of coherent sheaves. The fundamental exact sequences are higher order analogies of the Atiyah sequence, and an interesting problem is to try to define invariants for coherent sheaves using the fundamental exact sequences and the principal parts.

Te/kaffe.

15.10 – 16.00 **D. Eriksson,** Paris: *On the Brauer-Manin obstruction for zero-cycles.*
Abstract: In the 1970's Manin proposed a stronger Hasse condition for the existence of rational points on projective varieties over number fields. One now knows that this condition is not sufficient for the existence of a rational point, but a natural question to ask is: What does it imply? Colliot-Thelene has conjectured that having no Brauer-Manin obstruction implies the existence of a zero-cycle of degree 1 (the second best thing to a rational point), inspired by an article by S. Saito which proved this (conditionally) for curves, and a result of P. Salberger, who gave a proof for pencils of conics. We propose a much simplified (conditional) proof and a stronger version of the result of S. Saito, and also suggest a generalization to higher dimensions (work in progress).

PLURIKOMPLEXA SEMINARIET

Marcus Sundhäll: Schatten-von Neumann properties of bilinear Hankel forms of higher weights and some related matrix-valued Bergman projections

Abstract: We study the Schatten-von Neumann properties of bilinear Hankel forms of higher weights on the unit ball of $\mathbf{C}^n$. It turns out that some questions are closely related to boundedness of matrix-valued Bergman type projections. I shall present some preliminary results for the Bergman projections on Bergman spaces of tensor-valued holomorphic functions on the unit ball of $\mathbf{C}^n$. More precisely I will characterize bounded, compact, Hilbert-Schmidt and Schatten-von Neumann class $\mathcal{S}_p$-Hankel forms in terms of the membership of the symbols in certain Besov spaces, $2 < p < \infty$, using boundedness of some related projections.

Tid och plats: Tisdagen den 14 december kl. 10.15 i sal MIC 2215, Matematiska institutionen, Polacksbacken, Uppsala universitet.

PLURIKOMPLEXA SEMINARIET

Christer Kiselman: Monodiffric functions

Abstract: At the first meeting of the seminar this semester, on September 7, 2004, I gave an introduction to holomorphic functions on discrete sets. I will now report on the progress made since then. This includes a better knowledge of the history of the theory and a description of envelopes of holomorphy in one variable.

Tid och plats: Tisdagen den 14 december kl. 13.15 i sal MIC 2215, Matematiska institutionen, Polacksbacken, Uppsala universitet.

PRESENTATION AV EXAMENSARBETE I MATEMATIK

Patrik Friggebo: Algebraiska olikheter

Sammanfattning: Problem rörande algebraiska olikheter är en grupp av uppgifter som ofta förekommer vid diverse tävlingar i matematik. Paul Vaderlind har skrivit en manual, *The Undeniable Charm of Inequalities,* i vilken han presenterar ett antal välkända algebraiska olikheter, åtföljda av ett fyrtiotal problem som man kan lösa genom att använda dessa olikheter. Mitt examensarbete har huvudsakligen bestått i att sammanställa bevis för olikheterna, samt att finna lösningar till problemen. Det är tänkt att dessa två dokument tillsammans skall ge den intresserade en inblick i detta kunskapsområde.

Jag kommer under presentationen av mitt arbete att formulera och bevisa ett urval av ovannämnda olikheter, samt visa hur man med hjälp av dessa olikheter kan lösa olika typer av matematiska problem.

Tid och plats: Måndagen den 20 december kl. 14.00 – 15.00 i sal 16, hus 5, Matematiska institutionen, SU, Kräftriket.

ALGEBRASEMINARIUM

Dan Laksov:
En determinantformel for ytre produkter av en polynomring

Sammanfattning: Vi skal forklare en determinantformel som er felles for flere områder av matematikken, som algebraisk geometri, kombinatorikk, og teorien for alternerende former. Spesielt er formalismen viktig for Schubert regning, der den gir en fremstilling av både kohomologien og homologien for Grassmann skjemaer.

Tid och plats: Onsdagen den 15 december kl. 13.15 – 14.15 i seminarierum 3733, Institutionen för matematik, KTH, Lindstedtsvägen 25, plan 7.

KOLLOKVIUM

Carel Faber:
On the geometry of the moduli space of curves

Abstract: Algebraic curves (varieties of dimension one) are in some sense the building blocks of general algebraic varieties. Over the complex numbers, curves may be viewed as Riemann surfaces. A fundamental invariant of a nonsingular curve is its genus (the number of holes of a Riemann surface). The moduli space M_g of nonsingular curves of genus g captures the essence of how curves vary in families. After an introduction to the moduli space, I will discuss several results and open problems concerning its geometry. If time permits, I will discuss some arithmetic aspects as well.

Tid och plats: Onsdagen den 15 december kl. 15.30 – 16.30 i seminarierum 3721, Institutionen för matematik, KTH, Lindstedtsvägen 25, plan 7.

GRADUATE COURSE IN MATHEMATICS

An invitation to spectral function theory

Lecturer: **Serguei Shimorin**

The course will be given in January – March 2005, with 2 two-hour lectures per week. The first lecture will be on Tuesday, January 18, at 15.15 in seminar room 3721, Department of Mathematics, KTH, Lindstedtsvägen 25, floor 7.

Description of the course: The theory of Hardy classes and their operators is now a classical chapter of complex analysis, harmonic analysis, and operator theory. Its applications include such classical topics as Fourier series, rational approximation, moment problems, as well as more recent developments in scattering theory, signal processing, and optimal control. In our course, we shall deal with basic concepts and tools of the theory: invariant subspaces of the shift operator, Riesz-Nevanlinna canonical factorization, Hankel and Toeplitz operators, interpolation problems, etc. The aim is to give "a taste", a background of the theory and to discuss directions of applications.

Literature: N. K. Nikolskii, *Operators, Functions and Systems: An Easy Reading. Vol. I: Hardy, Hankel and Toeplitz.* There is also a volume II of this book, but it is not necessary for the course.

SEMINARIUM I NUMERISK ANALYS

Smadar Karni:
Source linearization for inhomogeneous conservation laws

Abstract: The presence of source terms in hyperbolic conservation laws allows for non-trivial steady-state solutions to exist already in one space dimension. They are characterized by a perfect balance between the flux gradient and the source term, none of which is necessarily small. Traditional split-step time integration schemes are unable to respect that balance and often do not work satisfactorily near steady state limits.

We present a Roe-type upwind algorithm, where steady-state considerations are used as guidance in source linearization. Results will be shown for the shallow water system and for the gas dynamics system with surface tension. Time permitting, application to multilayer shallow water systems and to multiphase flow will be discussed.

Tid och plats: Onsdagen den 15 december kl. 14.15 – 15.00 i rum 4523, Nada, KTH, Lindstedtsvägen 5, plan 5.

SEMINAR IN STATISTICAL GENETICS AND BIOINFORMATICS

Juni Palmgren:
Elements of statistical learning:
Data mining, inference and prediction

Abstract: Triggered by the text by Hastie, Tibshirani, Friedman, *The Elements of Statistical Learning: Data Mining, Inference, and Prediction,* Springer-Verlag, 2001, I will discuss methodology for predicting clinical outcomes based on a battery of biochemical, demographic and lifestyle factors. Linear models are contrasted with local regression methods, and prediction performance is discussed in terms of bias, variance and model complexity. Special attention is given to smoothing splines and the use of generalized additive models (GAM's). Learning from data plays a key role in science and technology at large, and the text by Hastie et al clarifies similarities and differences between concepts and language used in engineering, computer science and statistics, respectively. It deals with (generalized) linear models, regression trees, neural networks, support vector machines, etc., under a common conceptual umbrella. David Ruppert (JASA 2004) states that the book is valuable for statisticians needing an introduction to machine learning and for computer scientists wishing to learn more about statistics (cf. also http://www-stat.stanford.edu/~tibs/ElemStatLearn/main.html).

A secondary aim of the seminar is to discuss the potential for a joint SU-KTH-KI graduate course based on the book.

Tid och plats: Tisdagen den 21 december kl. 14.00 – 16.00 i rum 306 (Cramérrummet), hus 6, Matematiska institutionen, SU, Kräftriket.

DISPUTATION I NUMERISK ANALYS

Malin Siklosi

disputerar på avhandlingen

Aspects of Viscous Shocks

fredagen den 17 december kl. 14.00 i Kollegiesalen, Administrationsbyggnaden, KTH, Valhallavägen 79. Till fakultetsopponent har utsetts *professor Smadar Karni,* University of Michigan, USA.

Abstract of the thesis

This thesis consists of an introduction and five papers concerning different numerical and mathematical aspects of viscous shocks. Hyperbolic conservation laws are used to model wave motion and advective transport in a variety of physical applications. Solutions of hyperbolic conservation laws may become discontinuous, even in cases where initial and boundary data are smooth. Shock waves is one important type of discontinuity. It is also interesting to study the corresponding slightly viscous system, i.e., the system obtained when a small viscous term is added to the hyperbolic system of equations. By a viscous shock we denote a thin transition layer which appears in the solution of the slightly viscous system instead of a shock in the corresponding purely hyperbolic problem.

A slightly viscous system, a so-called modified equation, is often used to model numerical solutions of hyperbolic conservation laws and their behaviour in the vicinity of shocks. Computations presented elsewhere show that numerical solutions of hyperbolic conservation laws obtained by higher order accurate shock capturing methods in many cases are only first order accurate downstream of shocks. We use a modified equation to model numerical solutions obtained by a generic second order shock capturing scheme for a time dependent system in one space dimension. We present analysis that shows how the first order error term is related to the viscous terms and show that it is possible to eliminate the first order downstream error by choosing a special viscosity term. This is verified in computations. We also extend the analysis to a stationary problem in two space dimensions.

Though the technique of modified equation is widely used, rather little is known about when (for what methods, etc.) it is applicable. The use of a modified equation as a model for a numerical solution is only relevant if the numerical solution behaves as a continuous function. We have experimentally investigated a range of high resolution shock capturing methods. Our experiments indicate that for many of the methods there is a continuous shock profile. For some of the methods, however, this not the case. In general the behaviour in the shock region is very complicated. Systems of hyperbolic conservation laws with solutions containing shock waves, and corresponding slightly viscous equations, are examples where the available theoretical results on existence and uniqueness of solutions are very limited, though it is often straightforward to find approximate numerical solutions. We present a computer-assisted technique to prove existence of solutions of non-linear boundary value ODE's, which is based on using an approximate, numerical solution. The technique is applied to stationary solutions of the viscous Burgers' equation. We also study a corresponding method suggested by Yamamoto in *SIAM J. Numer. Anal.,* vol. 35(5), 1998, and apply also this method to the viscous Burgers' equation.

GRADUATE READING COURSE IN MATHEMATICAL STATISTICS

Rolf Sundberg: Statistics for microarrays

The course will be given at Stockholm University during the spring term 2005, and it is worth 5 p.

Background: Some of us feel a need to learn more about what statistical methods are used in, or proposed for microarray analysis, and about the special statistical problems in that area. We will do this by reading together a new textbook, *Statistics for Microarrays,* and some supplementary literature.

Course literature: The basic course book will be Ernst Wit & John McClure, *Statistics for Microarrays. Design, analysis and inference.* Wiley, Chichester 2004; ISBN 0-470-84993-2. This book will be supplemented by material from other books and other sources, in particular Terry Speed (Editor), *Statistical Analysis of Gene Expression Microarray Data.* Chapman & Hall, CRC 2003; ISBN 1-58488-327-8.

Course contents: The book by Wit and McClure is divided in two parts, "Getting good data", and "Getting good answers". The first part is about statistical design, and about normalization and quality assessment. The second part is about discrimination and clustering, and about testing hypotheses and prediction. Terry Speed's book goes deeper into all these topics. Some illustrations using the package R will be included.

Pre-knowledge: The course will be a graduate course in mathematical statistics. This does not imply that other students could not benefit from following the course and reading the same literature. However, it does mean that we will pass quickly over techniques and aspects assumed to be well-known to graduate students in mathematical statistics. More precisely, the student is assumed to be quite familiar with linear and log-linear models, factorial experiments, and frequentist and Bayesian principles for statistical inference (corresponding to the SU courses "Linjära modeller", "Log-linjära modeller", "Statistisk inferensteori II"), and to know a little of multivariate analysis.

Examination: Presentation of course topics and active participation in discussions will be evaluated, and will be the main requirement for course credit points, together with some computer exercises. An oral examination will probably be added at the end.

Application: Tell me (preferably by e-mail), if you want to participate. A moderate number of course participants will be admitted, with preference for those intending to fulfil the examination requirements.

Course start and end: The first meeting will be in the middle of January 2005. More detailed information will appear before that. The course will end before summer.

Teachers: I will be responsible for the course, but the participants must take their own responsibility for making the course successful.

Rolf Sundberg
E-mail: rolfs@math.su.se

FÖRDJUPNINGSKURS I MATEMATIK

5B1473 Elementär differentialgeometri

Lecturer: **Jens Hoppe**

The course will be given in January – March 2005, with 2 two-hour lectures per week. The first lecture will be on Wednesday, January 26, at 15.15 in seminar room 3733, Department of Mathematics, KTH, Lindstedtsvägen 25, floor 7.

I will try to combine elements of the classical, seemingly "elementary" (but truly inexhaustible), theory of curves and surfaces embedded in three-dimensional (Euclidean) space with an introduction to the more abstract "modern" notions in differential geometry.