



BRÅKET



Information om seminarier och högre undervisning i matematiska ämnen i Stockholmsområdet

NR 2

FREDAGEN DEN 16 JANUARI 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 22 januari
kl. 13.00.

Disputation i statistik

Jan Hagberg disputerar vid SU på
avhandlingen *On Degree Variance
in Random Graphs* fredagen den
23 januari kl. 10.00. Se sidan 3.

Kurser

Ralf Fröberg: Talteori. Se sidan 2.
Dan Laksov: Endelige grupper og
deres karakterer. Se sidan 4.

SEMINARIER

Må 01–19 kl. 15.15–16.00. Seminarium i matematisk
statistik. Tomas Torstensson presenterar sitt
examensarbete: *Reliability in fatigue — On the
choice of distributions in the load-strength model*.
Seminarierum 3733, Institutionen för matematik,
KTH, Lindstedtsvägen 25, plan 7. Se sidan 3.

Må 01–19 kl. 16.15–17.00. Seminarium i matematisk
statistik. Adam Jonsson Oduya presenterar
sitt examensarbete: *Understanding an anomaly in
the solution of a Stochastic Optimal Control prob-
lem*. Seminarierum 3733, Institutionen för mate-
matik, KTH, Lindstedtsvägen 25, plan 7. Se sidan
6.

Ti 01–20 kl. 14.00–15.00. Mittag-Leffler Seminar.
Alexei Rudakov, NTNU, Trondheim: *Lie(s)
algebra $E(5,10)$ and complexes of its representa-
tions*. Institut Mittag-Leffler, Auravägen 17,
Djursholm.

On 01–21 kl. 13.15. Seminarium i analys och dyna-
miska system. Nina Uraltseva, St. Petersburg
State University: *Title to be announced*. Seminarie-
rum 3721, Institutionen för matematik, KTH,
Lindstedtsvägen 25, plan 7.

On 01–21 kl. 13.15–15.00. Logikseminariet Stockholm-
Uppsala. (*Observera tiden!*) Tor Sandqvist:
Hävdandevillkor och klassisk logik. Sal 3513, Mate-
matiska institutionen, Polacksbacken, Uppsala
universitet. Se sidan 4.

Fortsättning på nästa sida.

Kurser

Sergei Merkulov: Cyclic Operads and Graph Complexes. Se
sidan 2.

Henrik Shahgholian: Obstacle Problems in Mathematical
Physics and Industry. Se sidan 5.

Seminarier (fortsättning)

To 01–22 kl. 14.00–15.00. Mittag-Leffler Seminar. Piotr M. Hajac, Polish Academy of Sciences: *Hopf-cyclic cohomology*. Institut Mittag-Leffler, Auravägen 17, Djurs-holm.

To 01–22 kl. 14.00. Seminarium i statistik. (Observera dagen och tiden!) Tom Snijders, Department of Sociology, University of Groningen: *New specifications for exponential random-graph models*. Sal B705, Statistiska institutionen, SU, Universi-tetsvägen 10B, plan 7, Frescati.

Tom Snijders är fakultetsopponent vid Jan Hagbergs disputation. Se sidan 3.

To 01–29 kl. 13.15–14.15. Presentation av examensarbete i matematik. Martin Hessler: Perfect Codes. Diskutant: **Björn Winkler**. Seminarierum 3721, Institu-tionen för matematik, KTH, Lindstedtsvägen 25, plan 7.

FÖRDJUPNINGSKURS I MATEMATIK**Ralf Fröberg: Talteori**

Kurslitteratur: IRELAND and ROSEN: *A Classical Introduction to Modern Number Theory*, Springer-Verlag.

Preliminärt omfång: Kap. 1–6.3, 7–8.2, 10–11.2, 12–13.1, 16.1–16.2, 17.1–17.7, samt en stencil om kedjebräk.

Tid och plats: Måndagar kl. 15.15–17.00 i rum 306, hus 6, Matematiska institutionen, SU, Kräftriket. Kursen startar den 26 januari.

Examinationen kommer att bestå av inlämningsuppgifter som utdelas varje vecka, samt ev. muntlig tentamen.

Ralf Fröberg

DOKTORANDKURS I MATEMATIK**Sergei Merkulov:****Cyclic Operads and Graph Complexes**

Tid och plats: Fredagen den 30 januari kl. 13.15–15.00 i rum 306, hus 6, Matematiska institutionen, SU, Kräftriket.

Föreläsare: Sergei Merkulov.

Titel på föredraget: **Cyclic operad of associative algebras and fat graphs.**

We resume on January 30 a lecture course on Cyclic Operads and Graph Complexes. In a series of 4–5 lectures we discuss in detail a particular case of the operad of associative algebras and the associated graph complex — the complex of fat (or ribbon) graphs. Our major themes are: 1) interrelations between fat graphs and Riemann surfaces with punctures; 2) isomorphism between rational cohomology of the moduli space of Riemann surfaces with punctures and the homology of the fat graphs complex; 3) an explicit construction of a cycle in the fat graphs complex out of an arbitrary A -infinity algebra (in particular, associative algebra) with metric.

SEMINARIUM I MATEMATISK STATISTIK

Tomas Torstensson

presenterar sitt examensarbete:

Reliability in fatigue — On the choice of distributions in the load-strength model

Abstract: In this thesis the influence of the choice of distributions in the load-strength model is considered. Accurate predictions of the failure probability are very useful when aiming at the most cost effective design of a component. Two distributions for load and strength are evaluated, the lognormal distribution and the Weibull distribution. From the load-strength model the failure probability can be determined which is the probability that the component in question fails within a specific time. The main conclusion is that the lognormal distribution should be used rather than the Weibull distribution, especially when the data available are limited. A possible way of updating the model with observed failure rates using Bayesian methods is also suggested.

Tid och plats: Måndagen den 19 januari kl. 15.15 – 16.00 i seminarierum 3733, Institutionen för matematik, KTH, Lindstedtsvägen 25, plan 7.

DISPUTATION I STATISTIK

Jan Hagberg

disputerar på avhandlingen

On Degree Variance in Random Graphs

fredagen den 23 januari kl. 10.00 i hörsal B3, SU, Frescati. Till fakultetsopponent har utsetts *Tom Snijders*, Department of Sociology, University of Groningen.

Abstract of the thesis

This thesis is concerned with degree moments and degree variance in random graphs. The degree of vertex i in a graph is the number of edges incident to vertex i .

In the first paper, degree moments and functions of degree moments are investigated for three random graph models. In statistical applications of random graph models the degree moments, and functions of the degree moments, have been found useful both as summary statistics and for inference on particular random graph models. Exact and asymptotic formulas are given for various degree statistics, in particular the degree variance.

The second paper focuses on the degree variance. Exact and asymptotic distributions of the degree variance are investigated for Bernoulli graphs and uniform random graphs. For graphs of large order, we show that the degree variance is approximately gamma distributed with parameters obtained from the first two moments of the degree variance. The usefulness of the results is illustrated by a graph centrality test with a critical value obtained from the gamma distribution.

The third and last paper is concerned with extreme values and other attained values of the degree variance among graphs of fixed order and size, and among graphs of fixed order. The structure of the extreme graphs is investigated, and it is shown that the maximum value of the degree variance can be obtained from integer sequences associated to the triangular numbers. Explicit formulas for the number of possible values and recurrence relations for the attained values of the degree variance are developed.

LOGIKSEMINARIET STOCKHOLM-UPPSALA

Tor Sandqvist:

Hävdandevillkor och klassisk logik

Abstract: Classical deduction is typically justified in terms of preservation of the property of truth, construed as capable of attaching to a sentence independently of speakers' ability in principle to recognize it.

Mathematicians and philosophers uncomfortable with this notion of truth (typically intuitionists) find themselves facing an unhappy choice: either to renounce common-sense classical inference and retreat to a weaker logic, or to persist in their classical ways without being able to justify their practice.

In the seminar I shall attempt to escape this dilemma by presenting an alternative semantics for the logical operators based not on truth conditions but on assertion conditions of statements. The theory is akin to well-known intuitionistic interpretations of the logical operators, but unlike these it turns out (by intuitionistically acceptable meta-reasoning) to render all classical first-order inferences valid.

The presentation will be in Swedish or English according to the listeners' preferences.

Tid och plats: Onsdagen den 21 januari kl. 13.15–15.00 i sal 3513, Matematiska institutionen, Polacksbacken, Uppsala universitet.

DOKTORANDKURS I MATEMATIK

Dan Laksov:

Endelige grupper og deres karakterer, 5B5201

Tid och plats: Måndagar kl. 15.15–17.00 i seminarierum 3721, Institutionen för matematik, KTH, Lindstedtsvägen 25, plan 7. Kursen startar den 2 februari.

Upplysningar: <http://www.math.kth.se/~laksov>.

Grupper er sentrale i matematikken og dens anvendelser, både innenfor naturvitenskaper og teknikk. Den viktigste teknikken for å studere grupper er de konkrete representasjonene av gruppene, og spesielt de tilhørende karakterene. Kurset skal gi en grundig forståelse av karakterer og hvordan disse bestemmer endelige grupper. Vi skal også regne ut karakterene for vanlige endelige grupper. Spesielt vil vi presentere den klassiske teorien for karakterer for den symmetriske gruppen, slik den ble gjort av Frobenius og Schur for mer enn hundre år siden.

Som forkunnskaper behøves noen kjennskap til lineær algebra, og helst bør man kjenne til noen vanlige grupper. Mitt håp er at kurset kan taes av alle, fra første årets studenter til doktorander.

Jeg vil gjøre oppmerksom på at Sergei Merkulov gir et liknende kurs på Stockholms universitet. Dette kurset vil bli mer avansert og det er mulig å ta begge kursene og få full poeng for begge.

Dan Laksov

**Self-study course in
Obstacle Problems in Mathematical Physics and Industry,
5 course credit, spring 2004**

Course leader: **Henrik Shahgholian**, Department of Mathematics, KTH, telephone 08-790 67 54, e-mail henriksh@math.kth.se, URL: <http://www.math.kth.se/~henriksh/>.

Information:

<http://www.math.kth.se/~henriksh/studentinfo/03-04/hinderproblem/frame.html>.

Start: Friday, January 30, at 13.15–15.00, in seminar room 3733, Department of Mathematics, KTH, Lindstedtsvägen 25, floor 7.

This course is self-studying. We start on January 30th with an introduction and suggestions for topics. Participants will then choose a topic to present later in the semester (1 hour presentation).

During this period, before presentations, all participants should hand in their homework. Participants are also welcome to make appointments for help and consultation, during the self-study period.

Language: English.

Goal: To learn about certain problems in mathematical physics related to industrial problems. The prime goal, besides learning about how mathematics — and especially partial differential equations — can be used to formulate problems in physics, mechanics, finance, biology, and industry, is to introduce students to real-world problems and problems in the frontier of active research. The course can be seen as an introduction to the topic “Free Boundary Problems”, and there are possibilities of further study and writing Master Thesis (examensarbete) in mathematics.

Topics:

The obstacle problem: Deformation of a membrane, Variational inequality, Bending of a plate, American Option, Mathematical Biology (wound healing, tumour growth), Torsion of an elastic-plastic cylindrical bar, Cavitation problem in hydrodynamic lubrication, . . .

Free boundary problems: Conservation laws in continuum physics, Filtration, Dam problem, Flow with wake in channel past profiles, Stefan problem, Continuous casting, Shape optimization, Oil recovery from reservoir, . . .

Mathematical tools: Basic functional analysis, Function spaces, Green’s formula and boundary value problems, second order elliptic PDE.

Variational inequality: The projection theorem, existence results, stability, comparison and maximum principles.

Prerequisites: Standard courses in analysis. Contact the course leader.

Literature: JOSE-FRANCISCO RODRIGUES, *Obstacle Problems in Mathematical Physics*, North-Holland, Mathematics studies 134, (1986). Also additional handouts and research papers, if necessary.

Examination: The examination will consist of two parts: Home work assignments and 1 hour presentation.

Henrik Shahgholian

SEMINARIUM I MATEMATISK STATISTIK**Adam Jonsson Oduya**

presenterar sitt examensarbete:

**Understanding an anomaly in the solution
of a Stochastic Optimal Control problem**

Abstract: The optimal way to manage an aquifer where the water level behaves like the Bachelier process is, under specific circumstances, of a surprising type. We find that one optimally extracts water when the water level is in either of two disjoint intervals. It was asked under what assumptions optimal management bears this unexpected feature and whether it can be understood in any intuitive way. This thesis will answer these questions.

Tid och plats: Måndagen den 19 januari kl. 16.15 – 17.00 i seminarierum 3733, Institutionen för matematik, KTH, Lindstedtsvägen 25, plan 7.
