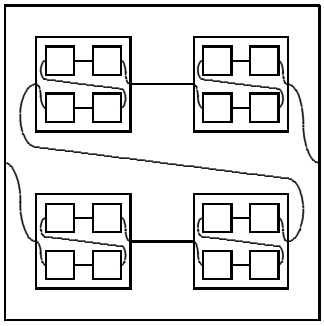
Department of Mathematics and Statistics
University of Helsinki
Annual Report 2007



Department of Mathematics and Statistics
University of Helsinki
Annual Report 2007

Edited by
Jouni Luukkainen

Helsinki, September 2008

Contact information:

Address:

Department of Mathematics and Statistics
P.O. Box 68 (Gustaf Hällströmin katu 2b)
FI-00014 UNIVERSITY OF HELSINKI
Finland

Telephone: +358 9 1911

Telefax: +358 9 191 51400

E-mail: mathdept@cc.helsinki.fi

WWW-homepage: http://mathstat.helsinki.fi

Contents

1. Overall view

The Department of Mathematics and Statistics of the University of Helsinki is situated in two faculties, the Faculty of Science and the Faculty of Social Sciences. In July 2004 the department moved to new premises, the Exactum building (Gustaf Hällströmin katu 2b) in the Kumpula Campus. The department also has two offices in the premises of the Faculty of Social Sciences (Unioninkatu 37).

In 2007 the teaching faculty comprised a full time staff of 49; this consists of 20 professors, 20 lecturers, 7 assistants, and 2 instructors. There were about 10–15 teachers on a part-time basis in 2007. The department had 86 docents (in 2007, five new docents were appointed). The department accommodates researchers and foreign visiting scholars funded by the Academy of Finland and other external sources. The administrative and technical staff consists of 9 persons.

The department admits annually around 250–300 students to the mathematics or statistics programme. The name of the degree depends on the faculty the student has entered. In the Faculty of Science the degrees are the B.Sc., M.Sc., Ph.Lic., and Ph.D. degrees. In the Faculty of Social Sciences the degrees are the B.Soc.Sc., M.Soc.Sc., Lic.Soc.Sc., and D.Soc.Sc. degrees. In the new two-cycle degree system, adopted by the University of Helsinki at the beginning of the autumn term 2005, students in the mathematics programme can choose for the M.Sc. degree between three major subjects: mathematics, applied mathematics, and mathematics teacher. In the statistics programme the major subject for the M.Sc. and M.Soc.Sc. degrees is statistics. At the beginning of the autumn term 2006, the Faculty of Science introduced the bioinformatics major subjects within the statistics and computer science programmes, but at the beginning of the autumn term 2007 they were phased out and instead merged in the major subject of the new Master's Degree Programme in Bioinformatics. The structuring of the studies of statistics by the Faculty of Science also included the start of the new Master's Degree Programme in Bayesian Statistics and Decision Analysis with statistics as the major subject at the beginning of the autumn term 2007.

In the fall term 2007, 1567 students were majoring in mathematics or statistics. In addition there were 113 postgraduate students. Of the postgraduate students 66 worked at the department as assistants or as researchers financed by the university, the Academy of Finland, the graduate schools, or a private grant. During the year, 61 students took M.Sc. degree, 12 took Ph.Lic. degree, and 10 took Ph.D. degree in mathematics; 1 student took M.Sc. degree in statistics. More exactly, of these 10 Ph.D. degrees, 1 was in applied mathematics and 2 in biometry. In statistics, 12 students took M.Soc.Sc. degree, 1 took Lic.Soc.Sc. degree, and 1 took D.Soc.Sc. degree. The total amount of credit points (in the old system of so called study weeks) awarded to students was 21628.

The department gives ancillary courses in mathematics and statistics for students of physics, chemistry, and computer science. Students in many other degree programmes, in all the faculties, take mathematics and statistics courses as well. This strong methodological and service character of the department is reflected in the fact that over fifty percent of the yearly credit points are attributed to students minoring in mathematics or statistics.

In 2007 the department was participating in seven Graduate Schools: mathematical analysis and its applications; inverse problems; mathematical logic and algebra; stochastics and statistics; computational biology, bioinformatics, and biometry;

computational methods of information technology; and population genetics.

In the teaching of applied mathematics the department has cooperated with some industrial companies. The department has a postgraduate programme in industrial mathematics which is a part of the European programme ECMI.

The main research areas at the department are analysis, mathematical physics, transformation groups, mathematical logic, stochastics, and statistics. The staff of the department took part in 29 research projects funded by the Academy of Finland and in three network projects funded by the European Union.

In the year 2000 an evaluation of research was carried out by the Academy of Finland in all mathematics departments in Finnish universities. To quote the report of the evaluation panel, "the University of Helsinki is clearly the leading Finnish center of research in pure mathematics, due to its overall size and the presence of several strong groups". In the year 2005 an evaluation of research during 1999–2004 was carried out in the whole University of Helsinki. The Department of Mathematics and Statistics achieved the highest grade. Researchers of the department take part in four Centres of Excellence in research selected by the Academy of Finland: the Research Unit of Geometric Analysis and Mathematical Physics, the Centre of Population Genetic Analyses, the Research Group of Economic Structures and Growth, and the Finnish Centre of Excellence in Inverse Problems. In the first and fourth of these the department is the co-ordinating partner.

In 2007 the researchers of the department published 101 refereed papers in journals and conference proceedings. Research to appear soon, or surveyed, was reported in 26 preprints or working papers and 92 communications in mathematical or statistical meetings and foreign seminars. The department has a preprint series of its own; in 2007 there appeared numbers 450–473.

The library of the former Department of Mathematics and main part of the library of the former Department of Statistics are now part of the Kumpula Science Library. In 2007 the accumulation of new mathematical or statistical books was 129 copies and the whole science library received 1200 titles of periodicals and reports, from which about 250 were in mathematics or statistics. In addition, many electronic information facilities are available. The library, being the largest mathematical library in Finland, also serves other Finnish universities.

The department has about 280 microcomputers, of which 25 are available to the students in two microcomputer classrooms. The computers are in daily use for text processing, typesetting, communication with foreign research institutions, and running mathematical or statistical programs, numerical or symbolical, also in supercomputers via nets.

The international journal Annales Academiae Scientiarum Fennicae Mathematica is edited in the department. The Finnish Mathematical Society has its office at the department. Teachers of the department have been responsible for the national activity of the International Mathematical Olympiads (IMO).

The department has representatives in various national organizations, for example in the Research Council for Natural Sciences and Engineering, and in the Matriculation Examination Board. There are also many international organizational contacts. The department has a member in the Board of the Mittag-Leffler Institute (Sweden) since 1986. The European Mathematical Society (EMS) is registered in Finland and has its office at the department.

In 2007 six students of the department participated in the ERASMUS student exchange program.

2. Staff

2.1. Regular staff

Pure and applied analysis.

Astala, Kari, Ph.D., Professor, Academy Professor
Harjulehto, Petteri, Ph.D., Postdoctoral Researcher (AF)
Holopainen, Ilkka, Ph.D., University Lecturer, Acting Professor
Hurri-Syrjänen, Ritva, Ph.D., University Lecturer, Acting Professor
Koskenoja, Mika, Ph.D., Doctor-assistant, Acting University Lecturer
Kupiainen, Antti, Ph.D., Professor, Academy Professor
Martio, Olli, Ph.D., Professor
Mattila, Pertti, Ph.D., Professor
Mickelsson, Jouko, Ph.D., Professor
Näätänen, Marjatta, Ph.D., Senior Lecturer
Ola, Petri, Ph.D., University Lecturer
Päivärinta, Lassi, Ph.D., Professor
Partanen, Juha V., Ph.D., Instructor
Rickman, Seppo, Ph.D., Emeritus Professor
Saksman, Eero, Ph.D., Professor
Seppälä, Mika, Ph.D., Professor
Taskinen, Jari, Ph.D., University Lecturer
Toppila, Sakari, Ph.D., Professor
Tukia, Pekka, Ph.D., Professor
Tylli, Hans-Olav, Ph.D., University Lecturer
Väisälä, Jussi, Ph.D., Emeritus Professor

Topology and algebra.

Elfving, Erik, Ph.D., Acting Doctor-assistant, Acting Assistant
Honkasalo, Hannu, Ph.D., Department Secretary
Illman, Sören, Ph.D., Professor (Swedish), Senior Scientist (AF)
Junnila, Heikki, Ph.D., University Lecturer
Luukkainen, Jouni, Ph.D., Acting Senior Assistant
Pihko, Jukka, Ph.D., Instructor
Suominen, Kalevi, Ph.D., Emeritus Professor

Mathematical logic.

Hellsten, Alex, Ph.D., Acting University Lecturer, Acting Doctor-assistant
Huuskonen, Taneli, Ph.D., Acting University Lecturer
Hyttinen, Tapani, Ph.D., University Lecturer
Kennedy, Juliette, Ph.D., Acting University Lecturer
Luosto, Kerkko, Ph.D., Docent
Oikkonen, Juha, Ph.D., University Lecturer
Väänänen, Jouko, Ph.D., Professor

Stochastics.

Gasbarra, Dario, Ph.D., Researcher (CE), Acting University Lecturer
Nummelin, Esa, D.Tech., Professor
Nyrhinen, Harri, Ph.D., University Lecturer
Sottinen, Tommi, Ph.D., University Lecturer

Statistics.

Ekholm, Anders, Ph.D., Emeritus Professor
Laaksonen, Seppo, Ph.D., Professor
Lehtonen, Risto, Ph.D., Professor, Research Professor
Miettinen, Jarkko, Lic.Soc.Sc., M.Sc. (Econ.), Assistant
Mustonen, Seppo, Ph.D., Emeritus Professor
Niemi, Hannu, Ph.D., Professor
Pere, Pekka, Ph.D., University Lecturer
Puranen, Juha, Lic.Soc.Sc., Senior Lecturer
Saikkonen, Pentti, D.Soc.Sc., Professor
Tarkkonen, Lauri, D.Soc.Sc., Professor
Valaste, Maria, M.Soc.Sc., Acting Assistant, Coordinator
Vehkalahti, Kimmo, D.Soc.Sc., Acting University Lecturer

Biomathematics and biometry.

Arjas, Elja, Ph.D., Professor
Auranen, Kari, Ph.D., University Lecturer
Corander, Jukka, Ph.D., University Lecturer, Researcher (AF)
Eerola, Mervi, Ph.D., University Lecturer
Geritz, Stefan, Ph.D., University Lecturer
Gyllenberg, Mats, D.Tech., Professor, Senior Scientist (AF)
Heikkinen, Juha, Ph.D., University Lecturer

2.2. Other teachers and researchers

The following abbreviations are used: AF = Academy of Finland, CE = Centre of Excellence, EU = European Union, GS = Graduate School, pg = grant from a private foundation (or from a foreign public source), Tekes (Finnish Funding Agency for Technology and Innovation), UH = grant from the University of Helsinki.

Ajanki, Oskari, M.Sc. (Eng.), Research Assistant (AF), Teaching Assistant
Akudibillah, Gordon, M.Sc., Researcher (AF)
Alamäki, Antti, Webmaster (WebALT, EU)
Ala-Mattila, Vesa, M.Sc., Doctoral Student (CE), Teaching Assistant
Alanko, Henrik, Guidance Tutor
Arponen, Heikki, M.Sc., Doctoral Student (AF)
Ballesteros, Miguel, Doctoral Student
Bardsley, John, Ph.D., Visiting Professor
Berti, Stefano, Ph.D., Postdoctoral Researcher (Tekes)
Bissell-Siders, Ryan, M.Sc., Doctoral Student (UH), Fee-paid Teacher
Blåfield, Linda, Trainee (WebALT)
Blåsten, Eemeli, Research Assistant (CE)
Böss, Kalle, M.Sc., Doctoral Student (GS)
Caprotti, Olga, Ph.D., Project Manager (EU)
Chousionis, Vasileios, M.Sc., Doctoral Student (GS), Teaching Assistant
Clop Ponte, Albert, Postdoctoral Researcher (EU)
Costea, Şerban, Ph.D., Postdoctoral Researcher (CE)
De Simone, Emiliano, Ph.D., Researcher (AF)
Dong Xiaojin, Fee-paid Teacher
Eerola, Tapio, M.Sc., Doctoral Student (GS), Fee-paid Teacher

Ekonen, Markku, Ph.D., Fee-paid Teacher
Fagerholm, Edvard, Teaching Assistant
Fluch, Martin, Ph.Lic., Doctoral Student (AF), Fee-paid Teacher
Granlund, Seppo, Ph.D., Docent
Gupta, Rashi, M.Sc., M.Sc. (Eng.), Doctoral Student (GS, CE)
Haapakoski, Jouni, Guidance Tutor
Haario, Heikki, Ph.D., Docent
Hakulinen, Riku, M.Sc., Doctoral Student (CE)
Halko, Aapo, Ph.D., Teaching Assistant
Hämäri, Severi, Teaching Assistant
Harju, Markus, M.Sc., Researcher (CE)
Häsä, Jokke, Teaching Assistant
Hautala, Anni, Guidance Tutor
Haverinen, Rauli, Compiler
Heino, Jenni, D.Tech., Postdoctoral Researcher (CE)
Heino, Outi, Coordinating Guidance Tutor
Heino, Ville, M.Sc., Research Assistant (AF, UH), Fee-paid Teacher
Heinonen, Antti, Guidance Tutor
Hella, Lauri, Ph.D., Docent
Hellsten, Lauri, Guidance Tutor
Hinkkanen, Eino, Teaching Assistant
Hirvonen, Åsa, Ph.Lic., Doctoral Student (GS)
Holmström, Lasse, Ph.D., Docent
Huveneers, François, M.Sc., Doctoral Student (AF)
Hyhkö, Heikki, Teaching Assistant
Hytönen, Tuomas, Ph.D., Postdoctoral Researcher (AF)
Järvenpää, Sauli, Teaching Assistant
Järvilehto, Tarmo, Ph.Lic., Researcher (AF)
Joensuu, Jani, Ph.Lic., Doctoral Student (CE), Teaching Assistant
Joráti, Hadi, Ph.D., Postdoctoral Researcher (EU)
Jost, Céline, Ph.D., Doctoral Student (GS, pg)
Judin, Pekka, Ph.Lic., Doctoral Student (CE)
Kaasalainen, Mikko, Ph.D., Academy Research Fellow (AF)
Kaila, Risto, Ph.D., Teaching Assistant
Kanerva, Okko, Ph.D., Fee-paid Teacher
Karvo, Tiina, Guidance Tutor
Kauppi, Salla, Coordinating Guidance Tutor
Kemppainen, Antti, M.Sc. (Eng.), Doctoral Student (pg, AF), Teaching Assistant
Kesälä, Meeri, Ph.D., Doctoral Student (GS, pg)
Ketola, Jaakko, Trainee (CE)
Kisdi, Éva, Ph.D., Researcher (AF), Fee-paid Teacher
Kohonen, Jukka, M.Sc., Researcher (AF), Teaching Assistant
Koistinen, Petri, D.Tech., University Researcher, Fee-paid Teacher
Koivupalo, Heikki, Guidance Tutor
Komi, Henna, M.Sc., Doctoral Student (pg), Fee-paid Teacher
Kontinen, Juha, Ph.D., Postdoctoral Researcher (AF)
Kontu, Mari, Guidance Tutor
Korhonen, Janne, Guidance Tutor, Teaching Assistant

Koriseva, Eija, M.Sc. (Eng.), Fee-paid Teacher
Korppi, Tuomas, Ph.D., Postdoctoral Researcher (AF), Teaching Assistant
Koskinen, Johanna, Guidance Tutor
Kuitunen, Panu, Guidance Tutor
Kulathinal, Sangita, Ph.D., Researcher (AF)
Kulikov, Vadim, Teaching Assistant
Kuparinen, Anna, Ph.D., Researcher (CE, AF)
Laakso, Teemu, M.Sc. (Eng.), Researcher (AF)
Lahti, Oona, Guidance Tutor
Lahtinen, Aatos, Ph.D., Emeritus Professor
Laine, Marko, Ph.Lic., Fee-paid Teacher
Laitila, Jussi, Ph.D., Researcher (AF)
Lamberg, Lars, Ph.D., Researcher (Tekes)
Lassas, Matti, Ph.D., Docent
Laurila, Mikko, Guidance Tutor
Lehtinen, Anniina (WebALT)
Lehtinen, Johanna, Trainee (WebALT, EU)
Lehto, Olli, Ph.D., Academician, Emeritus Professor
Lehto, Pertti, Ph.D., Teaching Assistant
Lehto, Saara, M.Sc., Doctoral Student (AF, pg)
Lehtonen, Tapani, Ph.D., Docent
Leppäranta, Anna-Riikka, Guidance Tutor
Lindberg, Sauli, M.Sc., Research Assistant (AF), Teaching Assistant
Lindén, Henri, Ph.D., Researcher (pg), Teaching Assistant
Linnoinen, Krista, Guidance Tutor
Lipponen, Henri, M.Sc., Doctoral Student
Lipsanen, Jari, Teaching Assistant
Liu, Xiaoli, Researcher (AF)
Loikkanen, Juha, M.Sc., Researcher (AF)
Luisto, Rami, Guidance Tutor
Määttä, Matti, Researcher (pg)
Malmivuori, Markku, Ph.D., Teaching Assistant
Martin, Jussi, M.Sc., Doctoral Student (AF), Teaching Assistant
Marttinen, Pekka, M.Sc., Doctoral Student (GS)
Mei, Peng, Doctoral Student (AF)
Moroni, Rossana, Doctoral Student (jointly with KTL)
Muhonen, Eija, Guidance Tutor
Muratore-Ginanneschi, Paolo, Ph.D., Senior Researcher (CE)
Mutshinda Mwanza, Crispin, M.Sc., Researcher (AF)
Myrskylä, Mikko, Ph.D., Doctoral Student (GS)
Nevanlinna, Anni (Lilli), Guidance Tutor
Nieminen, Pekka, Ph.D., Doctoral Student (GS), Postdoctoral Researcher (AF), Teaching Assistant
Niemistö, Hannu, Ph.Lic., Doctoral Student (GS), Teaching Assistant
Nikula, Miika, Teaching Assistant
Nissinen, Piia, Guidance Tutor
Norros, Ilkka, Ph.D., Docent
Noykova, Neli, Ph.D., University Researcher (CE)
Nuija, Aleksandr, Doctoral Student (AF), Teaching Assistant

Nurmi, Ville, M.Sc., Researcher (AF, GS), Teaching Assistant
O'Hara, Robert, Ph.D., Academy Research Fellow (AF)
Oinonen, Lotta, M.Sc., Teaching Assistant
Oksanen, Susanna, Guidance Tutor
Ondracek, Petr, Doctoral Student (GS), Teaching Assistant
Özdamar, Elif Özge, Doctoral Student (GS)
Pakkanen, Mikko, M.Sc., Doctoral Student (AF), Teaching Assistant
Palomäki, Matti, Guidance Tutor
Partanen, Leo, Guidance Tutor
Pauna, Matti, Ph.D., Project Planner (EU)
Peltola, Miina, Trainee (WebALT)
Peltonen, Kirsi, Ph.D., Docent
Peltonen, Petri, Teaching Assistant
Peura, Markus, D.Tech., Fee-paid Teacher
Piiroinen, Petteri, Ph.D., Researcher (CE)
Pikkuhookana, Pinja, M.Sc., Researcher (AF)
Pirinen, Matti, M.Sc., Doctoral Student (CE), Teaching Assistant
Prause, István, Ph.D., Researcher (pg), Postdoctoral Researcher
Preoteasa, Diana, M.Sc., Doctoral Student (GS)
Přiklopil, Tadeáš, M.Sc., Doctoral Student (AF)
Pulkkinen, Olli, Guidance Tutor
Puranen, Anssi, Guidance Tutor
Ramm-Schmidt, Erik, M.Sc., Doctoral Student (CE), Teaching Assistant
Reunanen, Kaisa, Guidance Tutor
Rintala, Tiina, LUMA project person, Secretary
Romu, Tiina, Secretary, Guidance Tutor
Rontu, Jenny, Guidance Tutor
Ruokolainen, Juha, Ph.D., Teaching Assistant
Saarinen, Paula, Guidance Tutor
Sagizbaeva, Odenna, M.Sc., Doctoral Student (GS)
Salminen, Mikko, Guidance Tutor
Salo, Mikko, Ph.D., Postdoctoral Researcher (AF)
Schwager, Monika, Ph.D., Researcher (AF)
Service, Robert, M.Sc., Doctoral Student
Silfverberg, Miikka, Teaching Assistant
Sillanpää, Mikko J., Ph.D., Academy Research Fellow (AF)
Sirén, Jukka, M.Sc., Doctoral Student (CE)
Solheim, Erling, M.Sc., Fee-paid Teacher
Stenlund, Mikko, Ph.D., M.Sc. (Eng.), Postdoctoral Researcher (AF)
Tähtinen, Vesa, Ph.Lic., Researcher (AF), Teaching Assistant
Talikota, Sarish, M.Sc., M.Sc. (Eng.), Researcher (AF)
Talponen, Jarno, Ph.Lic., Doctoral Student (GS, pg), Teaching Assistant
Tammela, Hanna, Guidance Tutor
Tamminen, Susanna, Guidance Tutor
Tang, Jing, M.Sc., Doctoral Student (CE)
Tapaninen, Pekka, Non-military Servant
Thomas, Andrew, Researcher (CE)
Tienari, Matti, Ph.D., University Researcher (CE)
Tiensuu, Sampo, Non-military Servant

Tikkanen, Mika, Research Assistant
Timperi, Kalle, Teaching Assistant
Toepfer, Eljas, M.Sc., Doctoral Student (AF)
Traat, Imbi, Ph.D., Docent
Tzou, Leo, Ph.D., Postdoctoral Researcher (CE)
Tuomi, Olli, Guidance Tutor
Tuomiranta, Tuomas, M.Sc., Doctoral Student (EU), Teaching Assistant
Turpeinen, Heini, Guidance Tutor
Utz, Margarete, M.Sc., Doctoral Student (GS)
Vähäkangas, Aleksi, Ph.Lic., Doctoral Student (GS), Teaching Assistant
Vähäkangas, Antti, Ph.Lic., Doctoral Student (AF, pg)
Valkeila, Esko, Ph.D., Docent
Vänskä, Simopekka, Ph.D., Researcher (Tekes), Fee-paid Teacher
Varvio, Sirkka-Liisa, Ph.D., Researcher (CE)
Vehtari, Aki, D.Tech., Docent
Vesanen, Petri, M.Sc., Doctoral Student (AF), Teaching Assistant
Vesanen, Tiina, M.Sc., Teaching Assistant
Viitanen, Aino, Guidance Tutor
Vikberg, Thomas, Trainee, Guidance Tutor
Vikman, Eki, Guidance Tutor
Villaveces, Andrés, Ph.D., Visiting Professor
Virolainen, Matti, M.Sc., Doctoral Student (AF), Teaching Assistant
Virtanen, Jani, Ph.D., Postdoctoral Researcher (AF), Fee-paid Teacher
Vuolle-Apiala, Juha, Ph.D., Docent
Vuori, Timo, M.Sc., Teaching Assistant
Vuorinen, Matti, Ph.D., Docent
Wallin, Olli, M.Sc., Teaching Assistant
Weder, Ricardo, Ph.D., University Researcher (CE)
Yan, Ping, Ph.D., Researcher (AF)
Ylinen, Kari, Ph.D., Docent
Ylinen, Lauri, M.Sc. (Eng.), Doctoral Student (GS), Teaching Assistant

2.3. Administrative, library, and technical staff

Hautala, Terhi, Research Secretary
Honkasalo, Hannu, Ph.D., Department Secretary (see also 2.1)
Laakso, Pirjo, Departmental Secretary
Nikunen, Martti, Ph.D., Laboratory Engineer –30.11., Information Technology Specialist at the IT Department 1.12.–
Pauninsalo, Raili, Departmental Secretary
Rikkonen, Katriina, M.Sc., Department Secretary
Taskinen, Matti, D.Sc. (Tech.), Computer Systems Manager
Tuohino, Pasi, Department Secretary
Ulmanen, Riitta, Departmental Secretary

2.4. Editorial staff

Riitta Ulmanen (see also 2.3) has been the administrative secretary of the European Mathematical Society and Ph.D. Mika Koskenoja (see also 2.1) the editorial secretary of the Annales Academiae Scientiarum Fennicae Mathematica.

3. Education

3.1. Students

Students majoring in mathematics or statistics are admitted in the degree programme in two ways, firstly on the basis of matriculation certificate and secondly via entrance examination. The following table contains the numbers of inscribed majors and the total numbers of majors in mathematics and statistics in 2001–2007.

Year	2001	2002	2003	2004	2005	2006	2007
New majors (Fac. of Sc.)	220	211	258	281	208	272	241
New majors (Fac. of Soc. Sc.)	18	32	25	33	27	32	15
Majors (Fac. of Sc.)	1168	1178	1251	1331	1336	1426	1396
Majors (Fac. of Soc. Sc.)	136	149	155	174	177	184	171

In 2007, there were 113 postgraduate students.

In 2007, 42 foreign students were studying at the department having their major subject in the mathematics programme or in the statistics programme. Of them 11 had the bachelor's degree as goal (1 of them being absent), 16 had the master's degree as goal (1 of them being absent), and 11 had a postgraduate degree as goal; in addition, 4 were studying a certain duration.

3.2. Programs of study

At the beginning of the autumn term 2005, the University of Helsinki adopted a new two-cycle degree system, i.e., bachelor–master system, in compliance with the joint European Bologna model. The new credits, the so called study points, correspond to the European system ECTS and replace the old system based on so called study weeks (an old credit was transformed into two new credits). The presentation in Subsections 3.2–3.3 follows the new system.

The department provides the mathematics programme and the statistics programme. The department is situated in two faculties, the Faculty of Science and the Faculty of Social Sciences, and the name of the degree depends on the faculty the student has entered. In the Faculty of Science the degrees are the B.Sc. (Bachelor of Science), M.Sc. (Master of Science), Ph.Lic. (Licentiate of Philosophy), and Ph.D. (Doctor of Philosophy) degrees. In the Faculty of Social Sciences the degrees are the B.Soc.Sc. (Bachelor of Social Sciences), M.Soc.Sc. (Master of Social Sciences), Lic.Soc.Sc. (Licentiate of Social Sciences), and D.Soc.Sc. (Doctor of Social Sciences) degrees.

At the beginning of the autumn term 2006, after an unofficial preliminary arrangement, the Faculty of Science formally introduced statistics as a degree programme, and also this decision is followed below. Before this extension of education, the Faculty of Science awarded postgraduate degrees in biometry, but this will not continue after the spring term 2008.

The major subject for the B.Sc. degree is mathematics or statistics; the major subject for the B.Soc.Sc. degree is statistics. In the mathematics programme the major subject for the M.Sc. degree is mathematics, applied mathematics, or mathematics teacher's education. In the statistics programme the major subject for the M.Sc. and M.Soc.Sc. degrees is statistics.

At the beginning of the autumn term 2006 the Faculty of Science introduced temporarily bioinformatics major subjects within the statistics and computer science programmes with a special student admission, but at the beginning of the autumn term 2007 they were phased out and instead merged in the major subject of the new Master's Degree Programme in Bioinformatics.

In order to be awarded the B.Sc. or the B.Soc.Sc. degree, a student must complete 180 credits of studies. Bachelor's degree is a prerequisite for Master's degree. In order to be awarded the M.Sc. or the M.Soc.Sc. degree, a student must complete 120 credits of studies. Bachelor's degree can be reached in 3 years of full-time study. Master's degree usually demands two more years.

A typical mathematics course is worth 10 credits and consists of 50–60 lectures (a lecture lasts 45 minutes) and 20–30 hours of problem solving classes in small groups. Some courses are taught also in Swedish or English.

Teacher's education includes some didactic studies which are carried out at the Department of Applied Sciences of Education within the Faculty of Behavioural Sciences of the university.

Beyond these degrees there are two postgraduate degrees, the Licentiate's degree, which is optional or aims at professional specialization, and the Doctor's degree, of which the latter has higher quality requirements.

For the B.Sc. degree in mathematics, the requirements are as follows (c for credit):

Mathematics	≥ 80 c
Minor subjects	≥ 50 c
General studies	15–17 c;

the total must be at least 180 c. The mathematics studies consist of the basic and intermediate studies. At least one minor subject is required, each of them of at least 25 c; typical choices are computer science, the physical sciences, chemistry, statistics, and theoretical philosophy; a module of methodological sciences (computer science and statistics) is also possible. In teacher's education the minor subjects include the basic and intermediate studies (60 c) in the second subject to be teached and 25 c of basic pedagogical studies. Every student writes a Bachelor's thesis (6 c).

For the M.Sc. degree in mathematics or applied mathematics it is needed at least 90 c of advanced studies in the major subject. There are four specialty lines in mathematics: algebra and topology, analysis, mathematical logic, and mathematical physics. There are five specialty lines in applied mathematics: applied analysis, biomathematics, computer-aided mathematics, insurance and finance mathematics, and stochastics. For the M.Sc. degree in mathematics teacher's education it is needed at least 70 c of advanced studies in the major subject and 35 c of intermediate pedagogical studies. The general studies comprise 2–5 c. The total must be at least 120 c, with more studies in the major subject or in the minor subject(s). A Master's thesis (40 c) is required as a part of the advanced studies of the major subject.

In the mathematics programme the major subject in the postgraduate degrees Ph.Lic. and Ph.D. can be mathematics or applied mathematics. An M.Sc. degree in one of the above mentioned three major subjects in the mathematics programme is a prerequisite. For each postgraduate student, an individual study programme is designed outlining the field of specialization, the topic of the thesis and the contents

and schedule of the other required studies. A supervisor is also assigned to each student.

The requirements for the Ph.Lic. degree are as follows:

1. Studies in the major subject and intermediate or advanced studies in a minor subject, 60 c.
2. Ph.Lic. thesis.

The major subject studies in part 1 normally consist of advanced level courses and seminars.

The requirements for the Ph.D. degree are as follows:

1. A Ph.Lic. degree in mathematics or applied mathematics, or part 1 of the requirements for Ph.Lic.
2. Ph.D. thesis.

For the B.Sc. and B.Soc.Sc. degrees in statistics, the requirements are as follows:

Statistics	≥ 70 c
Minor subjects	≥ 50 c
General studies	14–18 c;

the total must be at least 180 c. The statistics studies consist of the basic and intermediate studies. At least one minor subject is required, each of them of at least 25 c. Mathematics is required as a minor subject with the courses (30 c) Analysis I–II (or equivalents of them) and Linear algebra and matrices I–II. Other recommended secondary subjects are for example computer science, social sciences, psychology, medicine, ecology and systematics, and the biosciences; a module of methodological sciences (computer science and mathematics) is also possible. Every student writes a Bachelor's thesis (6 c). The only difference between the two degrees is in the required language studies.

For the M.Sc. and M.Soc.Sc. degrees in statistics it is needed at least 85 c of advanced studies in the major subject. There are three specialty lines in statistics: biometry, measurement and survey methodology, and time series analysis and econometrics. The biometry specialty line is divided into three sublines: bioinformatics and statistical genetics, environmental statistics, and medical statistics. The general studies comprise 2–6 c. The total must be at least 120 c, with more studies in the major subject or in the minor subject(s). A Master's thesis (40 c) is required as a part of the advanced studies of the major subject.

The M.Sc. degree in bioinformatics can be earned in the Master's Degree Programme in Bioinformatics, organized jointly by the University of Helsinki and Helsinki University of Technology. The first student admission took place in the autumn term 2006. In the major subject it is needed a minimum of 70 c of advanced studies in bioinformatics, including an M.Sc. thesis of 40 c. In the minor subjects, the requirements are such that the B.Sc. and M.Sc. degrees must totally contain a minimum of 25 c of biology, medicine or other suitable subject and a minimum of 60 c of mathematics, statistics, and computer science, and of these a minimum of 40 c must be in the M.Sc. degree itself. The general studies are 1–4 c.

In the statistics programme the major subject in the postgraduate degrees Ph.Lic., Lic.Soc.Sc., Ph.D., and D.Soc.Sc. is statistics. An M.Sc. or M.Soc.Sc. degree in the statistics programme is a prerequisite. For each postgraduate student, an individual study programme is designed outlining the field of specialization, the topic of

the thesis and the contents and schedule of the other required studies. A supervisor is also assigned to each student.

The requirements for the Ph.Lic. and Lic.Soc.Sc. degrees are as follows:

1. Studies in the major subject and intermediate or advanced studies in a minor subject, 60 c.
2. Ph.Lic. or Lic.Soc.Sc. thesis.

The major subject studies in part 1 normally consist of advanced level courses and seminars.

The requirements for the Ph.D. and D.Soc.Sc. degrees are as follows:

1. A Ph.Lic. or Lic.Soc.Sc. degree in statistics, or part 1 of the requirements for Ph.Lic. or Lic.Soc.Sc.
2. Ph.D. or D.Soc.Sc. thesis.

3.3. Courses

The following is a list of all courses and seminars in 2007. The number of (ECTS) credits for each course is given in parentheses.

3.3.1. Mathematics

Basic and intermediate studies

Getting acquainted with mathematics (5): This course is intended for mathematics minors.

Calculus (10): Differential and integral calculus of one real variable. Introduction to Maple. This course is intended for mathematics minors. Teached in a virtual form.

Mathematical analysis (10): This course is intended for students of the Faculty of Social Sciences.

Mathematical analysis, continuation course (10): This course is intended for students of the Faculty of Social Sciences.

Analysis I (10): Elementary analysis in one real variable.

Analysis II (10): Elementary analysis in one real variable.

Linear algebra and matrices I and II (5 + 5): Elementary theory of real vector spaces, linear mappings, and matrices.

Algebra I (10): Elements of set theory. Introduction to some algebraic structures such as groups, rings, fields, and polynomial rings.

Topology I (10): Elements of point set topology with emphasis on euclidean and metric spaces.

Vector analysis (10): Elementary analysis in several variables.

Differential equations I and II (5 + 5): Elementary theory of ordinary differential equations.

Introduction to probability theory (5): Probability, random variables.

Introduction to discrete mathematics (5): Elementary set theory, relations, functions, induction, combinatorics, graph theory. Intended in particular for students of computer science.

Logic I (10): Introduction to propositional logic and predicate logic.

Elements of set theory.

Mathematical methods for scientists (10): Basic numerical methods using Matlab.

Mathematical typesetting in LateX.
Combinatorics (5).
Graphs (5).

Advanced studies

Algebra and topology:
Algebra II (10).
Topology II (10).
Topology III.
Transformation groups.
Prime Number Theorem.

Analysis:
Measure and integral (6).
Real analysis I (6).
Function theory I (10): Introduction to the theory of functions of a complex variable.
Functional analysis (10).
Functional analysis II.
Real analysis II.
Introduction to Kleinian groups.
Riemannian geometry.
Differentiable structures on metric spaces.
Harmonic maps I.
Analysis for Dirichlet series.
Spectral theory.
Differential calculus on Banach spaces.
Operator theory.
The hyperbolic metric in complex analysis.

Mathematical logic:
Mathematical logic (10).
Model theory in abstract elementary classes.
Large cardinals and iterated forcing.
Descriptive set theory and determinacy.
Advanced topics in set theory.
Recursion theory.

Mathematical physics:
Principal fibre bundles and Yang–Mills theory II.

Applied analysis:
Advanced course in applied analysis (6): Functional analysis, Fourier series, and differentiable mappings.
Introduction to mathematical projects for industry (8).
Mathematical projects for industry (14).
Partial differential equations.
Analysis on Clifford algebras.
Scattering theory.
Introduction to conformal field theory.
Inverse scattering: the time-dependent approach.

Biomathematics:
Mathematical modelling (10).
Evolution and the theory of games.
Mathematical methods in biology: A course for life scientists.

Computer-aided mathematics:
Introduction to numerics (10).

Insurance and finance mathematics:
Life insurance mathematics, continuation course.
Risk theory (8).
Risk theory, continuation course.
Mathematical finance.
Malliavin calculus.

Stochastics:
Stochastic processes (6).
Information theory.
Information theory, continuation course.
Stochastic analysis.
Lévy processes.

Mathematics teacher's education:
Advanced course for mathematics teachers (12): Advanced calculus with topology and measure theory organized in a seminar style.
Geometry (10).
Fundamental concepts of mathematics and their introduction with the Hungarian (Varga) method (4).
Basic concepts of (higher) school mathematics.
Mathematics teaching laboratory.
Analysis pro gradu seminar.

Seminar "Women, men, and mathematics".

Graduate seminars

Transformation groups.
Analysis.
Functional analysis.
Geometric analysis.
Inverse problems.
Logic.
Finite model theory.
Mathematical physics.
Geometry, topology, and physics.
Math–phys journal discussion club.
Stochastics.
Random graphs.
Insurance mathematics.
Graduate student seminar.

3.3.2. Statistics

Basic and intermediate studies

Introduction to statistics (4/8/10): This course is intended for statistics minors.
A second course in statistics (10): This course is intended for statistics minors.
Introduction to statistical inference (5): Introduction to mathematical statistics. Parameter estimation.
Data analysis (4/8).
Course in probability (10).
Statistical inference (10).
Linear models (5).
Sampling methods (6/8).
Applications of linear models (6/8).
Elements of statistical computing (4).
Statistics in practical research (8/10).
Frequency data and nonlinear multivariate analysis (5/10).
Introduction to applying R programs.
Bayesian analysis.
Elementary Bayesian analysis (9).

Advanced studies

General statistics:
A second course in statistical inference (10).
Multivariate methods (5/10).
Computational methods in statistics (8/10).

Biometry:
Spatial analysis of areal data.
Theory of survival and event history models.
Applications of event history models.
Statistical methods in epidemiology (10).
Statistical methods in genetic epidemiology and gene mapping (6/8).
Randomized and observational researches (6/8).
Spatial point processes (6/8).
Probability and stochastic processes (9).

Measurement and survey methodology:
Measurement and collection of statistical data (5/10).
Survey methodology (6/8).
General course on survey methodology.
Short course: Panel surveys in social and economic reseach and the treatment of nonresponse.
Short course on multilevel modelling.
Short course: Advanced survey sampling.

Time series and econometrics:
Stationary time series (8/10).
Nonstationary time series.

Graduate seminars

Biometry/reading group.
Biomathematics and biometry.
Computationally intensive data analysis.
Bachelor's and Master's theses seminar (4/8).
Survey methodology.
Statistical computing (SURVO).
Time series analysis and econometrics.

3.4. Teaching, studies, and graduates

This subsection is based on the old degree, credit point, and curriculum system that will be in effect until autumn 2008 on those students that began their studies before autumn 2005 and so choose. The old system was explained in Subsection 3.2 of the Annual Report 2004 of the Department of Mathematics and Statistics, University of Helsinki.

The total amounts of credit points awarded by the department in 2001–2007 are shown in Table 1.

Table 1. Credit points awarded to students

Year	2001	2002	2003	2004	2005	2006	2007
Credits (Fac. of Sc.)	12778	13198	13210	18121	17035	16150	15309
Credits (Fac. of Soc. Sc.)	5469	6681	7339	6870	6324	5327	6319

The numbers of M.Sc. theses in each curriculum of the mathematics programme in 2000–2007 are given in Table 2. The number of graduates is rather low as compared with the student intake. One reason for this is the nature of mathematics, which makes great demands on the students. Another reason for the drop-out is that many students are not intending to graduate in mathematics but rather use the first year mathematics studies as a preparation for admission to other degree programmes or universities.

Table 2. Numbers of M.Sc. theses per curriculum (mathematics programme)

Year	2000	2001	2002	2003	2004	2005	2006	2007	All
Mathematics	15	8	9	20	14	10	15	15	106
Applied math.	8	4	6	5	18	8	10	9	68
Computer math.		4	2	2	1	2	2	4	17
Teacher's	26	21	12	16	23	32	24	39	193
All	49	37	29	43	56	52	51	67	384

The number of M.Sc. theses in statistics was 1 in 2006 and 0 in 2007. The number of M.Soc.Sc. theses in statistics was 6 in 2004, 7 in 2005, 7 in 2006, and 12 in 2007.

Table 3 includes the numbers of postgraduate theses in 1999–2007 in the Faculty of Science side of the department (in 1999–2003 Department of Mathematics and Rolf Nevanlinna Institute together).

Table 3. Numbers of Ph.Lic. and Ph.D. theses

Year	1999	2000	2001	2002	2003	2004	2005	2006	2007	All
Ph.Lic.	4	4	10	6	9	4	2	7	8	54
Ph.D.	3	4	3	8	4	8	9	10	8	57

The number of Lic.Soc.Sc. theses in statistics was 1 in 2004, 0 in 2005, 1 in 2006, and 1 in 2007. The number or D.Soc.Sc. theses in statistics was 1 in 2004, 0 in 2005, 0 in 2006, and 1 in 2007.

M.Sc. theses

M.Sc. theses in mathematics curriculum

Mikko Daavittila: Kiintopistelauseita ja sovelluksia

Jani Isohanni: Määriteltävyys pakatussa datassa

Jarmo Jääskeläinen: Maksimaalifunktio reaalialueella

Juha Kapulainen: Hyperbolisesta metriikasta ja analyyttisistä funktioista eräissä kompleksitason alueissa

Jarmo Mäkelä: Interpolaatio Hardyn avaruuksissa

Pekka Malo: Hintaprosessien konveksia analyysiä

Inka-Maaria Näkkäläjärvi: Riippuvuuslogiikoista

Tadeáš Přiklopil: Kahden lajin populaatiodynamiikkaa

Mikael Rauhala: Itsesimilaarien fraktaalien Hausdorff-dimensio

Juan Sanchez-Murtoinperä: Ergodisuuslauseista

Tuomas Seppänen: Perinnöllisesti äärellisten joukkojen lineaarijärjestäminen

Tuomas Tuomiranta: De Rhamin lauseen todistus lyhdekohomologiateorian avulla

Petri Vesanen: Normaalin operaattorin funktionaalikalkyyli

Juhana Yrjölä: Numerical computation of the module of a quadrilateral

Alessio Zibellini: Rieszin teoria ja Helmholtzin yhtälö

M.Sc. theses in applied mathematics curriculum

Lauri Hallila: Satunnaisverkon kehitys

Hou Yongming: General economic equilibrium theory

Jussi Huotilainen: Monte Carlo -menetelmä säteilysuojauslaskennassa

Jesse Kolppo: Sijoitustuottojen, ansiotason ja elinkustannusten mallintaminen virheenkorjausmallilla

Saija Miettunen: Vastuuvelan "markkina-arvo" ja with-profit -vakuutukseen sisältyvän bonusoption arvo

Sari Mikola: Vahinkovakuutusyhtiön korvausvastuu ja vahinkojen lukumäärä

Ilkka Pölönen: Oligopoli Cournot'n mallin mukaan matemaattisessa taloustieteessä

Jani Store: Rationaalinen muodon säilyttävä spline-approksimointi

Ella Syvänne: Mertonin ongelma

M.Sc. theses in computer mathematics curriculum

Kimmo Arola: Least squares and Kalman filter with examples from GPS and time series

Lauri Arte: A method for analyzing mathematical algorithms by microprocessor simulation

Matti Harvala, Matti: Predicting cache miss ratios using analytic formulas and stack distances

Jenni Toivokoski: Numeeriset menetelmät Python-kielellä

M.Sc. theses in mathematics teacher curriculum

Jarno Ampuja: Perusepäyhtälöistä

Tarja Eerola: Matematiikan 9. luokan valtakunnalliset kokeet vuosina 1997–2007 ja kansalliset kokeet vuosina 1998–2004

Perttu Ervelius: Suora, taso ja kolmiulotteinen avaruus kuntina

Verna Haataja: Symmetrian matemaattinen olemus ja kauneus

Terhi Hautala: Ohjaajatuutorointi matematiikan ja tilastotieteen laitoksella — toteutus, kehittyminen ja haasteet

Terhi Heikkilä: Todennäköisyys lukion pitkän matematiikan oppikirjoissa

Tiina Heino: Lineaarialgebran hyödyntäminen lukion matematiikan opetuksessa

Anu Hellinen: Lukiolaisten argumentoinnista ja päättelystä jakolaskussa

Maria Huhtinen: Vaihtoehtoinen opetustapa integraalilaskentaan lukiossa

Juha Ihonen: Wirtingerin epäyhtälö

Hanna Jäntti: Graafisen laskimen ja sovelluksien hyödyntäminen differentiaaliyhtälöiden opetuksessa

Samuli Kauranne: Johtavuusyhtälön heikkojen ratkaisujen olemassaolo

Tuomas Kela: Banachin kiintopistelause

Juhani Kivimäki: Johdatus algebralliseen verkkoteoriaan

Outi Kokko: Differentiaalilaskenta lukion pitkän matematiikan oppikirjoissa — oppikirjojen vertailututkimus

Antti Korkeila: Monikulmion pinta-ala hyperbolisessa geometriassa ylemmän puolitason mallissa

Miska Kuoppala: Itsesimilaarit fraktaalit

Paula Kurki: Suoristuvat käyrät

Matti Kylä-Rekola: Preferenssirelaatio ja utiliteettifunktio, taloustieteen matematiikkaa

Heli Lehtonen: Sairaanhoitajaopiskelijoiden lääkelaskentataidot

Maria Lemponen: Vektoreiden opetus suomalaisessa ja englantilaisessa oppikirjassa

Suvi Lindholm: Lukualueet — Lukiolaisten lukualueiden tuntemus ja oppikirjojen käsittelytapa

Tuomas Mäkelä: Maksimaalifunktioista

Hanna Mäkinen: Lukion matematiikan opettajien käsityksiä omasta opettamisesta sekä oppilaista

Ari Meriläinen: Johdatus klassiseen lukuteoriaan

Malin Mårtens: What do teachers think about problem solving? A snapshot of the situation in Finland and New Zealand in the beginning of the 21st century.

Eero Näveri: Kvasihyperbolisesta metriikasta

Ina-Sofia Nieminen: Integraalilaskennan kurssi lukiossa ja jatko-opinnoissa yliopistossa, ammattikorkeakoulussa ja Teknillisessä korkeakoulussa

Mia Paaso: Geometrian historia. Poimintoja varhaishistoriasta 1900-luvulle

Miina Peltola: Lyhyen matematiikan kurssin Matemaattinen analyysi sisältö uudessa opetussuunnitelmassa

Juha Pietiläinen: Analyyttisistä funktioista

Anu Piiparinen: Matematiikan ja kuvataiteen yhdistämismahdollisuuksia peruskoulun opetuksessa

Tapani Savolainen: Yliopiston geometrian kurssimateriaali

Virpi Savolainen: Poincarén epäyhtälö tähtimäisessä alueessa

Hanna Sorsa: Paloista Platoneita

Matti Suomilammi: Upseerien dominanssi- ja riippumattomuusluvut $n \times n$-laudoilla ja shakin vaikutus matemaattiseen ongelmanratkaisuun

Laura Tuohilampi: Lukiolaisen osaaminen äärettömyyttä koskevassa kysymyksessä

Leena Törmä: Todennäköisyyden diskreetit jakaumat ja niiden opettaminen lukiolaisille

Johannes Vainio: Pitkän matematiikan ylioppilastehtävistä

M.Sc. theses in statistics

None.

M.Soc.Sc. theses in statistics

Outi Ahti-Miettinen: Kaksivaiheisen potenssikiintiöinnin käyttö otoksen tehostamisessa — esimerkkinä otoksen suunnittelu työvoimakustannusindeksin tietojen keruulle

Paul Blomstedt: Bayesläiset menetelmät diskriminatiivisessa ja generatiivisessa luokittelussa

Risto Hiltunen: Keskihajonta hinta–laatu-suhteen laskemisessa — rakennusalan suunnittelun tarjouskilpailujen tilastollinen tarkastelu

Mira Kajantie: Examining equity in access to health care using register data. Pathways to coronary revascularisations in Finland 1995–1998

Dadzie Samuel Kojo: Effects on ergonomic intervention on the improvement of low-back disorders, perceived health status and overall working ability among kitchen staff: one-year follow-up study

Jukka Kontto: Visualizing large epidemiological data sets using depth and density

Terhi Luoma: Itämeren alueen pohjoismaiden ja Iso-Britannian talouksien suhde kultakannan aikana ja toisen maailmansodan jälkeen

Jaakko Salo: ARIMA-malleilla ennustaminen — esimerkkeinä Venäjän ja Ruotsin väkiluvut

Tiina Sevon: Tilastollinen analyysi masennuslääkkeiden käytön yleisyydelle ja hoitosuosituksen toteutumiselle

Marja Snellman: Case definition of pneumococcal pneumonia: a latent class analysis approach

Kirsi Sokura: Suomen ECHP-aineiston tilastollinen laatu palkkamallien näkökulmasta

Eija Weck: Huuhaa-tutkimusta vai uutta tietoa tositarpeeseen? — Kriittinen katsaus markkinatutkimuksen menetelmiin ja käytäntöihin

Ph.Lic. theses

Vesa Ala-Mattila: Hausdorff properties of Patterson measures (mathematics)

Martin Fluch: P. A. Smith theory for p-adic transformation groups (mathematics)

Tomi Heiskanen: Kvasiminimoijat reaaliakselilla (mathematics)

Pekka Judin: Yksiulotteiset kvasiminimoijat ja kvasisuperminimoijat (mathematics)

Riikka Nurmiainen: Opiskelijoiden työskentelyn tarkastelu Mathematica-istunnoista kerättyjen lokitiedostojen avulla (mathematics)

Vesa Tähtinen: Anomalies in gauge theory and gerbes over quotient stacks (mathematics)

Eljas Törneblom: Vakiofunktiojoukkojen määriteltävyys jatkuvien funktioiden algebroissa (mathematics)

Antti Vähäkangas: The T1 theorem for potential operators (mathematics)

Lic.Soc.Sc. theses

Jarkko Miettinen: GARCH modeling with normal variance–mean mixtures (statistics)

Ph.D. dissertations

Tarmo Järvilehto: Thesis "Jumping numbers of a simple complete ideal in a two-dimensional regular local ring"; Department of Mathematics and Statistics, University of Helsinki, 2007, 70 pp., also in electronic form; public examination 3.2.2007; opponent: prof. Antonio Campillo (Universidad de Valladolid, Spain); Ph.D. degree in mathematics 20.4.2007.

Jukka Jokinen: Thesis "Joint regression and association models for repeated categorical responses"; Publications of the National Public Health Institute A21/2006, Helsinki, 2006, 35 pp., also in electronic form, and four articles; public examination 3.2.2007; opponent: prof. Philippe Lambert (University of Liège, Belgium); Ph.D. degree in biometry 23.3.2007.

Céline Jost: Thesis "Integral transformations of Volterra Gaussian processes"; Department of Mathematics and Statistics, University of Helsinki, 2007, 6+24 pp., also in electronic form, and four articles; public examination 19.5.2007; opponent: prof. Marina Kleptsyna (Université du Maine, France); Ph.D. degree in applied mathematics 15.6.2007.

Anna Kuparinen: Thesis "Gene flow from transgenic plant populations: Models and applications for risk assessment"; Yliopistopaino, Helsinki, 2006, 29 pp., also in electronic form, and six articles; public examination 4.1.2007; opponent: Dr. Broder Breckling (University of Bremen, Germany); Ph.D. degree in biometry 26.1.2007.

Pekka J. Nieminen: Thesis "Composition operators, Aleksandrov measures and value distribution of analytic maps in the unit disc"; Department of Mathematics and Statistics, University of Helsinki, 2007, 4+20 pp., also in electronic form, and three articles; public examination 17.2.2007; opponent: prof. Carl Sundberg (University of Tennessee, USA); Ph.D. degree in mathematics 21.5.2007.

Hannu Niemistö: Thesis "Locality and order-invariant logics"; Department of Mathematics and Statistics, University of Helsinki, 2007, 92 pp., also in electronic form; public examination 18.12.2007; opponent: prof. Leonid Libkin (University of Edinburgh, Great Britain); Ph.D. degree in mathematics 23.1.2008.

Matti Pauna: Thesis "On games on non-wellfounded sets and stationary sets"; Department of Mathematics and Statistics, University of Helsinki, 2007, 4+53 pp., also in electronic form; public examination 29.5.2007; opponent: Dr. Andrés Villaveces (Universidad Nacional Bogotá, Columbia); Ph.D. degree in mathematics 15.6.2007.

István Prause: Thesis "Distortion of dimension under quasiconformal mappings"; Reports in Mathematics / Department of Mathematics and Statistics, University of Helsinki **462** (2007), 13 pp., also in electronic form, and three articles; public examination 16.6.2007; opponent: prof. Zoltan Balogh (Universität Bern, Switzerland); Ph.D. degree in mathematics 21.9.2007.

D.Soc.Sc. dissertations

Mikko Myrskylä: Thesis "Generalized regression estimation for domain class frequencies"; Research Reports **247**, Statistics Finland, Helsinki, 2007, 137 pp., also in electronic form; public examination 31.8.2007; opponent: prof. Domingo Morales (University Miguel Hernández of Elche, Spain); D.Soc.Sc. degree in statistics 24.10.2007.

3.5. Forms of teaching

The traditional forms of teaching mathematics and statistics are lectures, problem solving classes, and (principally in postgraduate studies) seminars. Teaching applied mathematics and statistics may include study projects applying numerical or statistical computer programs and, in applied statistics, even preparing a net poster. In 2007 there were around 120 small problem solving groups per period convening once a week. In addition to this traditional line, several pilot programmes have been run in recent years to advance teaching and collaboration between students and teachers at the department. Attempts have been made to develop forms of activity which meet students at all stages of their studies. Special effort has been put with great success in teaching the courses for beginning students. This has been done by choice of teachers and by attempts to activate the students during lectures and to meet their needs. Besides this general policy, the following special programmes were active in 2007.

Instruction groups. In connection with the main analysis course (Analysis I–II) the students took part in special instruction groups in addition to usual lectures and problem solving classes. In these groups the students worked together with the instructor on problems presented ex tempore. This activity was the version of tutoring in use for first year students. In the course Introduction to statistics there are special mathematics support groups.

Student and teacher tutoring. First year students are gathered in small groups guided by older students. The aim of these groups is to discuss problems of studying mathematics and to encourage the students to study together. Each group has a teacher tutor to give mathematical help when needed.

Study room. There is a special study room where the students can go and study and ask for help from an assistant.

Pro gradu seminar. In statistics it has been an old tradition of the Faculty of Social Sciences to have a Bachelor's and Master's theses seminar.

Study group. In autumn 1998 a new kind of learning environment in mathematics was added. About 30 students started in this programme in autumn 2007. These students study together the central portion of the basic and intermediate level of mathematics. The work is based on approaching entire courses (or mathematics in general) from general phenomena related to their central and most difficult problems. This form of instruction has been directed especially to teacher training.

3.6. Evaluation of teaching

The department is aware of the importance of regular evaluation of teaching. For some years, the department has carried out evaluation of courses via questionnaires filled in by students.

3.7. Employment prospects of graduates

The employment prospects for mathematics and statistics graduates have generally been good and they are expected to remain so. Most mathematicians are employed by teaching in schools, polytechnics, and universities. University teachers are usually also researchers; this is in particular the case with the Department of Mathematics and Statistics. Researchers in applied mathematics often act as consultants in industrial mathematics or participate in research projects of other sciences. Traditionally mathematicians have also worked in insurance companies. There is a growing demand of mathematicians in finance. Statisticians cooperate with researchers of behavioural and social sciences, medicine, ecology, molecular biology, economics, and technical sciences in applying probabilistic modelling and analysing data. Statisticians are needed in enterprises and administration for planning and analyzing activities.

4. Research

4.1. Review (2005)

During 1999–2004 the department took important new steps by hiring several top professors from other universities in Finland. We are particularly proud of having been able to add Pertti Mattila and Kari Astala from Jyväskylä to our traditionally strong analysis group. Our group in applied mathematics was completely revitalized by the hiring of the inversion theorist Lassi Päivärinta from Oulu and the biomathematician Mats Gyllenberg from Turku. We also hired Mika Seppälä from Florida to reshape our research in computer-aided mathematics. During 2003 preparations were made for a fusion of the Department of Mathematics, the Department of Statistics and the Rolf Nevanlinna Institute (RNI). The fusion took place starting from the beginning of 2004. In this process the large and successful biometry group of Elja Arjas, earlier in the research institute RNI, joined the mathematics and statistics departments. The fusion also brought Pentti Saikkonen, an excellent econometrician, from the Department of Statistics to the ranks of the newly enlarged Department of Mathematics and Statistics. These successful actions, coinciding with a move to the brand new Exactum-building in Kumpula, have put the department on a road to a very bright future. It comes then as no surprise that the results of the department have improved significantly in all fronts. In 2004 we exceeded our goal in doctoral training by 100%. The reshaping of the department has opened new research possibilities. Traditionally there has

been a strong group in stochastics (Nummelin) in the department. In the analysis group there is a newborn interest in stochastic methods (Astala, Päivärinta) and these methods are also widely used in mathematical physics (Kupiainen). Since the research of Arjas, Gyllenberg and Saikkonen is close to stochastic analysis, the department is looking forward to creating a very strong group in this area. Recent publications show that this is not only a hope. At the same time the department intends to maintain research in its traditional areas at the top international level. The department co-ordinates the Centre of Excellence in Geometric Analysis and Mathematical Physics.

The department has a large group working on a wide variety of topics in pure and applied mathematical analysis. All subgroups have strong international connections. Quasiconformal mappings (Astala, Martio, Tukia) has been traditionally a very strong area in Helsinki and it continues to be so. The group is working also on many closely related topics, such as applications of quasiconformal mappings to material science, inverse tomography (Astala and Päivärinta) where a long-standing open impedance tomography problem of Calderon was solved, and Kleinian groups and Teichmüller spaces. Gutlyanskiĭ and Martio have found new results on boundary smoothness of conformal mappings. Martio as well as Holopainen and Laakso also work in nonlinear potential theory and analysis in metric spaces. Much of Holopainen's work has been on manifolds and non-euclidean spaces. Various function spaces come up naturally in nonlinear potential theory and the theory of quasiconformal and quasiregular mappings—particular emphasis has been on variable exponent spaces. Mattila moved to Helsinki in 2003. He works in geometric measure theory and its applications to other parts of analysis like analytic capacity and removability problems. Taskinen and Tylli work on functional analysis. The work of Tylli concerns Banach spaces and their operators. With Odell he recently studied weakly compact approximation in Banach spaces. In applied analysis the main research area is inverse problems. Päivärinta and his students have studied inverse boundary value and spectral problems and scattering theory with special emphasis to conductivity problems (medical imaging, geological prospecting) and inverse problems in population dynamics. The group has strong connections to other analysis groups in the department and to the Helsinki University of Technology. Seppälä develops computational approaches to problems in conformal geometry. The central focus has been on Hilbert's 22nd Problem, the Problem of Numerical Uniformization, on Riemann surfaces and algebraic curves.

In mathematical physics Antti Kupiainen's research has dealt with dynamical systems, nonlinear parabolic PDE's and stochastic PDE's. In dynamical systems a new approach to Kolmogorov–Arnold–Moser theory was developed with Bricmont and Gawędzki and was applied to the construction of invariant tori for PDE's with postdoc Schenkel. With Bonetto and Lebowitz projections of fractal Sinai–Ruelle–Bowen measures of infinite dimensional hyperbolic dynamical systems were shown to be absolutely continuous w.r.t. Lebesgue measure. With Bricmont and postdoc Lefevere ergodicity and exponential mixing of stochastic 2d Navier–Stokes equation was proved in the so called turbulent situation. With Korvola and Taskinen novel scaling behaviour of front solutions of the fourth order nonlinear Cahn–Hilliard PDE were proved. With Gawędzki et al advection PDE with random scale invariant Hölder continuous and temporally correlated velocity fields was studied and was argued to have various scaling behaviours in the long or short time behaviour of solutions. Jouko Mickelsson, who recently moved permanently to the department,

has worked on geometric problems in quantum field theory. With Simon Scott he studied the Segal axiom system on functorial quantum field theory, applied to cases with broken gauge or diffeomorphism symmetries in models in both $1+1$ and higher dimensions. With Alan Carey he has worked on gerbes arising from quantum field theory models, applying index theory and representation theory of infinite-dimensional groups. An important applicaton of these ideas is a simple construction of twisted K-theory classes on compact Lie groups using a quantum field theory model.

The stochastic research group (Nummelin, Nyrhinen, Sottinen) has been active in the research of stochastic analysis, theory of finance, theory of Gaussian and self-similar processes, the theory of large deviations, insurance mathematics, Markov chains, and mathematical economics. Specific subjects of study have been the theory of arbitrage pricing, queuing theory, insurance ruin problems, and the theory of economic equilibrium.

In topology, the research group on transformation groups, lead by Illman, has proved the existence and uniqueness of G-equivariant triangulations of smooth manifolds on which an arbitrary Lie group G acts by a proper and smooth action; that every smooth proper G-manifold with compact orbit space has a well-defined simple G-homotopy type and that each G-diffeomorphism between such spaces has equivariant Whitehead torsion equal to zero; the existence of real analytic G-invariant Riemannian metrics; introduction of the strong-weak topology on the set of smooth G-maps between smooth G-manifolds; approximation of smooth G-maps by real analytic G-maps; and that when G is a Lie group each proper locally linear G-manifold has the G-homotopy type of a G-CW complex. Recently there is also renewed interest to attack the famous Hilbert–Smith conjecture. The research group has very good international contacts. Junnila works with topology of Banach spaces. The work is closely related to the theory of renormings. Junnila has studied the weak topology of a Banach space and the weak-star topology of a dual Banach space, and has obtained topological characterizations for several kinds of functional analytic properties that are relevant in renorming theory.

The Helsinki Logic Group, led by Väänänen, is well-known for its own paradigm in game-theoretic model theory that has led to breakthroughs in both the set-theoretically oriented infinitary logic in co-operation with Shelah, Todorcevic and Velickovic, and in the study of generalized quantifiers in finite model theory, in co-operation with computer scientists (Libkin) and philosophers of language (Westerståhl). Another area of logic that has been strongly influenced by this group (Hyttinen) is homogeneous model theory, which generalizes first order model theory considerably. Shelah-style classification theory for homogeneous classes has been developed. Also geometric stability theory for homogeneous classes is studied leading to co-ordinatization theorem. Several team members are in close co-operation with philosophers in the area of logic and philosophy of mathematics.

In statistics, characteristic to the research of the biometry group, which is a partner in the Centre of Excellence on Population Genetic Analyses, has been its strong emphasis on scientific substance as the most important criterion and motivation for the work. Nearly all papers published by the members of this group involve collaboration with other scientists, mostly with a biological or medical background, and real data. The motivation for this type of work comes from the general perception that thoughtful and skilled mathematical modeling, combined with novel statistical inferential and computational methodology, makes better science. In practice,

nearly all work carried out in the group has followed the Bayesian paradigm to statistics, then also involving a strong computational element. The range of topics, as well as the size of the biometry group itself, have grown substantially from the start in 1994, when two graduate students began their study on modeling and analyzing bacterial carriage data provided by the Finnish National Public Health Institute, and their work was supervised by an occasional visitor from the University of Oulu. The biometry group was formally established, then as a part of Rolf Nevanlinna Institute, and got its first regular faculty position in 1997. Currently, the research can be roughly grouped into the following categories: (1) modeling and analysis of infectious diseases, (2) genetic mapping and relationship estimation, (3) modeling and analysis of population size and structure, (4) statistical methodology for functional genomics and proteomics, (5) environmental and ecological modeling and inference, including risk assessment and decision support, (6) event history modeling and data analysis, (7) development of statistical methods, and (8) diverse theoretical contributions to statistical methodology, including graphical probability models, non-parametric Bayesian estimation and smoothing, and martingale and filtering methods.

In another area of statistics, econometrics (Saikkonen, Pere), where the department is a partner in the Centre of Excellence on Economic Structures and Growth, research has focused on the estimation and testing theory of scalar and vector autoregressive models used to model nonstationary trending time series. These models have played a central role in studying long run economic equilibrium relations. New test procedures to discriminate between stationary and so-called (co)integrated time series have been obtained, especially in the presence of structural breaks, and a very general asymptotic estimation and testing theory for cointegrated vector autoregressive models has been developed. A related research area has dealt with nonlinear models for stationary but strongly autocorrelated and possibly conditionally heteroskedastic time series for which a mixture of autoregressive models has been formulated and found empirically promising.

Research in measurement and survey methodology (Laaksonen, Tarkkonen, Vehkalahti) is focused on the measurement errors affecting various statistical models, adjustments due to missingness in survey data using imputation and weighting, variance estimation methods and software tools, multinational sampling designs and cross-country comparisons on wages flexibility using multi-level longitudinal data.

The biomathematics research group led by Gyllenberg, who joined the department in 2004, has on the one hand focused on the mathematical theory of structured populations and models that explicitly relates evolution by natural selection to population dynamics (ecology). Results on the qualitative behaviour of both finite and infinite dimensional dynamical systems generated by such models have been obtained. On the other hand, Gyllenberg has developed mathematical methods for bacterial taxonomy (classification of bacteria based on genotypic data) and used these methods to challenge the established taxonomy of the family Vibrionaceae. Gyllenberg has also considered mathematical models of human physiology and drug design.

The WebALT research group, lead by Seppälä, investigates with major EU funding, in co-operation with linguists (Carlson), advanced methods to redesign basic mathematics instruction by profiting of the multi-lingual possibilities offered for knowledge management by XML and MathML.

4.2. Funded research groups

The externally funded research groups and projects in 2007 were the following, in alphabetical order of the responsible director (AF = Academy of Finland, EU = European Union, ME = Ministry of Education, Tekes: Finnish Funding Agency for Technology and Innovation, UH = University of Helsinki).

Centre of population genetic analyses. *Responsible director*: Arjas. *Funding* (2002–2007): AF.

Statistical modelling of the ecological effects of GMOs in the boreal environment. *Responsible director*: Arjas. *Funding* (2004–2007): AF.

Bayesian latent class modelling for functional genomics: combining experimental results and data base knowledge (FGBayes). *Responsible director*: Arjas. *Funding* (2004–2007): AF.

Geometric analysis and its applications. *Responsible director*: Astala. *Funding* (2004–2009): AF.

Lars Ahlfors Centennial Celebration. *Responsible director*: Astala. *Funding* (2007): AF.

Conformal structures and dynamics. *Responsible director*: Astala. *Funding* (2007–2010): EU.

Bayesian learning of generalized graphical model structures. *Responsible director*: Corander. *Funding* (2005–2007): UH.

Test planning for genetic research in the whole genome sequence. *Responsible director*: Gasbarra. *Funding* (2006–2007): AF.

Mathematical foundations of adaptive dynamics. *Responsible director*: Geritz. *Funding* (2006–2007): AF.

Adaptive dynamics of multi-species systems. *Responsible director*: Geritz. *Funding* (2006–2008): UH.

The mathematical theory of adaptive dynamics of structured populations. *Responsible director*: Gyllenberg. *Funding* (2005–2008): AF.

Structure of the attractor in competitive systems motivated by ecology and evolution. *Responsible director*: Gyllenberg. *Funding* (2006–2009): AF.

Stability and bifurcation analysis of models for structured populations. *Responsible director*: Gyllenberg. *Funding* (2007): AF.

Research and education project in industrial mathematics. *Responsible director*: Gyllenberg, Kupiainen, Päivärinta. *Funding* (2006–2008): 100 Years Foundation of Technology Industry.

Variable exponent spaces. *Responsible director*: Harjulehto. *Funding* (2005–2008): AF.

Vector-valued singular integrals. *Responsible director*: Hytönen. *Funding* (2007–2009): AF.

Transformation groups. *Responsible director*: Illman. *Funding* (2007): AF.

New mathematical methods in planetary and galaxy research. *Responsible director*: Kaasalainen. *Funding* (2006–2008): AF.

Homology theory: A nonstandard angle of vision. *Responsible director*: Korppi. *Funding* (2007–2009): AF.

Mathematical physics. *Responsible director*: Kupiainen. *Funding* (2002–2009): AF.

From discrete to continuous models for multiphase flows. *Responsible director*: Kupiainen. *Funding* (2005–2007): Tekes.

Japan–Finland potential theory conference. *Responsible director*: Martio. *Funding* (2006–2007): AF.

Finnish Centre of Excellence in Geometric Analysis and Mathematical Physics.
Responsible director: Mattila. *Funding* (2002–2007): AF.

Geometrical analysis in Lie groups and applications. *Responsible director*: Mattila. *Funding* (2006–2009): EU.

Geometric problems of quantum field theory. *Responsible director*: Mickelsson. *Funding* (2007–2010): AF.

Mathematics magazine Solmu — research and development project.
Managing director: Näätänen. *Funding* (1998–): Wihuri foundation (AF, LUMA project, Finnish Cultural Foundation).

Large deviations and stochastic analysis and their applications to insurance mathematics, mathematical finance, and mathematical economics. *Responsible director*: Nummelin. *Funding* (2007–2009): AF.

Statistical modelling of ecological and genetic data. *Responsible director*: O'Hara. *Funding* (2004–2007): AF.

Inverse problems and reliability of models. *Responsible director*: Päivärinta. *Funding* (2005–2007): Tekes.

Sandike. *Responsible director*: Päivärinta. *Funding* (2005–2007): Tekes, GE Healthcare, PaloDEx.

Inverse problems in electromagnetics and image processing. *Responsible director*: Päivärinta. *Funding* (2005–2008): AF.

Finnish Centre of Excellence in Inverse Problems. *Responsible director*: Päivärinta. *Funding* (2006–2011): AF, Tekes.

Graduate School in inverse problems. *Responsible director*: Päivärinta. *Funding* (2006–2009): ME, AF.

Stochastic and harmonic analysis, interactions and applications. *Responsible director*: Saksman. *Funding* (2006–2009): AF.

eContentPlus Program Thematic Network Joining Educational Mathematics (JEM). *Responsible director*: Seppälä. *Funding* (2006-2009): EU.

Unified analysis of complex traits: phenotypes, multilocus markers, and gene expression microarrays. *Responsible director*: Sillanpää. *Funding* (2003–2008): AF.

Graduate School in mathematical analysis and its applications. *Responsible director*: Tylli. *Funding* (2007–2011): ME, AF.

Logic and its applications. *Responsible director*: Väänänen. *Funding* (1998–2007): AF.

Spectral theory of Toeplitz operators and matrices. *Responsible director*: Virtanen. *Funding* (2005–2008): AF.

4.3. Evaluation of research

In the year 2000 an evaluation of research was carried out by the Academy of Finland in all mathematics departments in Finnish universities. The following is a quotation from the report of the evaluation panel:

"The University of Helsinki is clearly the leading Finnish center of research in pure mathematics, due to its overall size and the presence of several strong groups. By far the strongest and largest of these groups are the analysts, who can count a commanding presence in areas relating to quasiconformal mapping. Here Martio leads a distinguished group in partial differential equations. The geometry of quasiconformal maps is represented by a deep and excellent group that includes a world leader in Tukia. The analysts also have a good presence in function spaces and functional analysis. Kupiainen is probably Finland's most famous mathematician at the moment. He is to be congratulated for a rapidly developing and extremely active and internationally recognized group in mathematical physics. This has brought an entirely new field to Finland. Väänänen leads a rather large group of logicians. This group is of very high quality and has managed to develop strong international contacts and collaborations. Illman leads a small but highly respected team in transformation groups."

In the year 2005 an evaluation of research during 1999–2004 was carried out in the whole University of Helsinki. The assessment was supervised by the Research Council of the University. The international panels were appointed by the Rector on the proposal of the Research Council.

The Department of Mathematics and Statistics achieved the highest grade in this evaluation. In the previous reseach assessment in 1999 the Department of Mathematics and the Department of Statistics were evaluated separately; the former obtained the highest grade. From the present assessment report:

"The grade has been given taking into account that the majority of the submitted publications are of a high international level and most others are of a good international level. Some of the research done in the Department is very strong, on a top European or world class level. In particular this applies to parts of the research in pure and applied analysis and in mathematical physics. It also applies to logic and parts of the research in statistics and biomathematics. The panel notes, however, that the Helsinki Department cannot be considered to be on the level of the best European mathematics departments, the reason being that major areas of mathematics are not covered. ... the committee felt that an attempt to recruit more widely should be made."

In 2001, the Research Unit of Geometric Analysis and Mathematical Physics was selected by the Academy of Finland as a centre of excellence in research for the years 2002–2007. The unit is a joint venture with the Department of Mathematics and Statistics at the University of Jyväskylä. Two of the three teams of this research unit work in Helsinki, the Mathematical Physics group of Antti Kupiainen and the group of Olli Martio working on Nonlinear PDE's and Metric Concepts in Analysis. The unit is headed by Pertti Mattila.

In 2005, the Research Unit of Inverse Problems was selected by the Academy of Finland as a centre of excellence in research for the years 2006–2011. The unit is a joint venture with the Universities of Kuopio and Oulu and the Helsinki, Lappeenranta, and Tampere Universities of Technology. The unit is headed by Lassi Päivärinta; other senior researchers at the department are Mikko Kaasalainen and Petri Ola.

The Statistical Genetics research group lead by Elja Arjas is a partner in the Centre of Population Genetic Analyses. The Econometrics research group is closely connected with the Research Unit of Economic Structures and Growth (RUESG) at the Department of Economics. The Centre of Population Genetic Analyses and the RUESG also are national centres of excellence funded by the Academy of Finland.

5. Publications

All printed research publications (items 1–87), articles in conference proceedings (88–101), preprints and working papers (102–127), teaching material (128–130), and publications of general interest (131–159) in 2007 due to the personnel (and to a few other persons affiliated to the department) are listed below in alphabetic order in Sections 5.1–5.5, respectively. Of these [82] is a research monograph. For technical reasons the coverage of the publications does not exactly fit with the calendar year 2007. Section 5.6 contains a list of all authors belonging to the personnel (or some to the guests), with references to the items authored by these persons. This list of publications does not include Ph.D. theses; they are listed separately in Section 3.4.

5.1. Printed research publications

1. Tero Aittokallio, Mats Gyllenberg, Olli Polo, and Arho Virkki, *Parameter estimation of a respiratory control model from noninvasive carbon dioxide measurements during sleep*, Mathematical Medicine and Biology **24** (2007), 225–249.
2. James W. Anderson, Kurt Falk, and Pekka Tukia, *Conformal measures associated to ends of hyperbolic n-manifolds*, Quarterly Journal of Mathematics **58** (2007), 1–15.
3. Mervi Antila, Annamari Tuulio-Henriksson, Tuula Kieseppä, Mervi Eerola, Timo Partonen, and Jouko Lönnqvist, *Cognitive functioning in patients with familial bipolar I disorder and their unaffected relatives*, Psychological Medicine **37** (2007), 679–687.
4. Sergey A. Antonyan and Erik Elfving, *The equivariant homotopy type of G-ANR's for compact group actions*, Manuscripta Mathematica **124** (2007), 275–297.
5. Heikki Arponen and Peter Horvai, *Dynamo effect in the Kraichnan magnetohydrodynamic turbulence*, Journal of Statistical Physics **129** (2007), 205–239.
6. Pekka Aula, Kimmo Vehkalahti, and Topiantti Äikäs, *Kaupunkimaine. Tutkimus kaupunkien maineen rakenteesta ja siihen vaikuttavista tekijöistä*, Tiivistelmä (7–8); Resumé (9–10): Städers anseende. Undersökning av hur städers anseende formas och av faktorer som påverkar den; Summary (11–12): City reputation. A study of the structure of the reputation of cities and of factors influencing it, Acta / Suomen Kuntaliitto **193** (2007), 108 pp.
7. Petri Böckerman, Seppo Laaksonen, and Jari Vainiomäki, *Who bears the burden of wage cuts?—Evidence from Finland during the 1990s*, International Journal of Manpower **28** (2007), 100–121.

8. Albrecht Böttcher and Jani Virtanen, *Norms of Toeplitz matrices with Fisher–Hartwig symbols*, SIAM Journal on Matrix Analysis and Applications **29** (2007), 660–671.
9. Giuseppe Cardone, Sergey A. Nazarov, Jan Sokolowski, and Jari Taskinen, *Asymptotics of Neumann harmonics when a cavity is close to the exterior boundary of the domain*, Comptes Rendus Mécanique **335** (2007), 763–767.
10. David Colton, Lassi Päivärinta, and John Sylvester, *The interior transmission problem*, Inverse Problems and Imaging **1** (2007), 13–28.
11. Jukka Corander, Mats Gyllenberg, and Timo Koski, *Random partition models and exchangeability for Bayesian identification of population structure*, Bulletin of Mathematical Biology **69** (2007), 797–815.
12. Odo Diekmann, Philipp Getto, and Mats Gyllenberg, *Stability and bifurcation analysis of Volterra functional equations in the light of suns and stars*, SIAM Journal on Mathematical Analysis **39** (2007), 1023–1069.
13. Odo Diekmann, Mats Gyllenberg, and Johan Metz, *Physiologically structured population models: towards a general mathematical theory*, Mathematics for ecology and environmental sciences, Biological and Medical Physics, Biomedical Engineering, edited by Y. Takeuchi, Y. Iwasa, and K. Sato, Springer, Berlin, 2007, pp. 5–20.
14. David Drasin and Yûsuke Okuyama, *Equidistribution and Nevanlinna theory*, Bulletin of the London Mathematical Society **39** (2007), 603–613.
15. J. Ďurech, Mikko Kaasalainen, A. Marciniak, et al (totally 42 authors), *Physical models of ten asteroids from an observers' collaboration network*, Astronomy and Astrophysics **465** (2007), 331–337.
16. Miroslav Engliš and Jari Taskinen, *Deformation quantization and Borel's theorem in locally convex spaces*, Studia Mathematica **180** (2007), 77–93.
17. Hanna T. M. Eskola and Stefan A. H. Geritz, *On the mechanistic derivation of various discrete-time population models*, Bulletin of Mathematical Biology **69** (2007), 329–346.
18. Marek Fila, Jari Taskinen, and Michael Winkler, *Convergence to a singular steady state of a parabolic equation with gradient blow-up*, Applied Mathematics Letters **20** (2007), 578–582.
19. Dario Gasbarra, Matti Pirinen, Mikko J. Sillanpää, and Elja Arjas, *Estimating genealogies from linked marker data: a Bayesian approach*, BMC Bioinformatics **8** (2007), no. 411, 31 pp.
20. Dario Gasbarra, Matti Pirinen, Mikko J. Sillanpää, Elina Salmela, and Elja Arjas, *Estimating genealogies from unlinked marker data: A Bayesian approach*, Theoretical Population Biology **72** (2007), 305–322.
21. Stefan A. H. Geritz, Éva Kisdi, and Ping Yan, *Evolutionary branching and long-term coexistence of cycling predators: Critical function analysis*, Theoretical Population Biology **71** (2007), 424–435.
22. Petr Gurka, Petteri Harjulehto, and Aleš Nekvinda, *Bessel potential spaces with variable exponent*, Mathematical Inequalities & Applications **10** (2007), 661–676.
23. Vladimir Gutlyanskiĭ and Olli Martio, *On regularity of a quasiconformal mapping at a point of maximal stretching*, Bulletin of the London Mathematical Society **39** (2007), 453–458.
24. Mats Gyllenberg, *Mathematical aspects of physiologically structured populations: the contributions of J. A. J. Metz*, Journal of Biological Dynamics **1** (2007), 3–44.
25. Petteri Harjulehto, *Variable exponent Sobolev spaces with zero boundary values*, Mathematica Bohemica **132** (2007), 125–136.
26. Petteri Harjulehto, Peter Hästö, and Mika Koskenoja, *Properties of capacities in variable exponent Sobolev spaces*, Journal of Analysis and Applications **5** (2007), 71–92.
27. Petteri Harjulehto, Peter Hästö, Mika Koskenoja, Teemu Lukkari, and Niko Marola, *An obstacle problem and superharmonic functions with nonstandard growth*, Nonlinear Analysis: Theory, Methods and Applications **67** (2007), 3424–3440.
28. Petteri Harjulehto, Juha Kinnunen, and Teemu Lukkari, *Unbounded supersolutions of nonlinear equations with nonstandard growth*, Boundary Value Problems **Art. ID 48348** (2007), 20 pp.
29. Petteri Harjulehto, Juha Kinnunen, and Katja Tuhkanen, *Hölder quasicontinuity in variable exponent Sobolev spaces*, Journal of Inequalities and Applications **Art. ID 32324** (2007), 18 pp.
30. Ilkka Holopainen, Urs Lang, and Aleksi Vähäkangas, *Dirichlet problem at infinity on Gromov hyperbolic metric measure spaces*, Mathematische Annalen **339** (2007), 101–134.

31. Ilkka Holopainen and Aleksi Vähäkangas, *Asymptotic Dirichlet problem on negatively curved spaces*, Journal of Analysis (Special volume containing the Proceedings of the International Conference on Geometric Function Theory, Special Functions and Applications, 2.–5.1.2006 / edited by R. W. Barnard and S. Ponnusamy) **15** (2007), 63–110.
32. Taina Huurre, Mervi Eerola, Ossi Rahkonen, and Hillevi Aro, *Does social support affect the relationship between socioeconomic status and depression? A longitudinal study from adolescence until adulthood*, Journal of Affective Disorders **100** (2007), 55–64.
33. Tuomas Hytönen, *Anisotropic Fourier multipliers and singular integrals for vector-valued functions*, Annali di Matematica Pura ed Applicata (4) **186** (2007), 455–468.
34. Tuomas Hytönen, *Estimates for partial derivatives of vector-valued functions*, Illinois Journal of Mathematics **51** (2007), 731–742.
35. Tuomas Hytönen, *Littlewood–Paley–Stein theory for semigroups in* UMD *spaces*, Revista Matemática Iberoamericana **23** (2007), 973–1009.
36. Tuomas Hytönen, Juha-Pekka Pellonpää, and Kari Ylinen, *Positive sesquilinear form measures and generalized eigenvalue expansions*, Journal of Mathematical Analysis and Applications **336** (2007), 1287–1304.
37. Tuomas Hytönen and Lutz Weis, *Singular convolution integrals with operator-valued kernel*, Mathematische Zeitschrift **255** (2007), 393–425.
38. Tapani Hyttinen and Meeri Kesälä, *Superstability in simple finitary AECs*, Fundamenta Mathematicae **195** (2007), 221–268.
39. Mikko Kaasalainen, Josef Ďurech, Brian D. Warner, Yurij N. Krugly, and Ninel M. Gaftonyuk, *Acceleration of the rotation of asteroid* 1862 *Apollo by radiation torques*, Nature **446** (2007), 420–422.
40. Juliette Kennedy and Jouko Väänänen, *Applications of regular filters and square principles in model theory*, Quaderni di Matematica (2006), 111–136.
41. Juha Kinnunen, Niko Marola, and Olli Martio, *Harnack's principle for quasiminimizers*, Ricerche di Matematica **56** (2007), 73–88.
42. Éva Kisdi, *No direct selection to increase offspring number of bet-hedging strategies in large populations: Simons' model revisited* (Short communication), Journal of Evolutionary Biology **20** (2007), 2072-2074.
43. Kim Knudsen and Mikko Salo, *Determining nonsmooth first order terms from partial boundary measurements*, Inverse Problems and Imaging **1** (2007), 349–369.
44. Annamaria Kuha, Annamari Tuulio-Henriksson, Mervi Eerola, Jonna Perälä, Jaana Suvisaari, Timo Partonen, and Jouko Lönnqvist, *Impaired executive performance in healthy siblings of schizophrenia patients in a population-based study*, Schizophrenia Research **92** (2007), 142–150.
45. Anna Kuparinen, Tiina Markkanen, Hermanni Riikonen, and Timo Vesala, *Modeling air-mediated dispersal of spores, pollen and seeds in forested areas*, Ecological Modelling **208** (2007), 177–188.
46. Anna Kuparinen and Juha Merilä, *Detecting and managing fisheries-induced evolution*, Trends in Ecology & Evolution **22** (2007), 652–659.
47. Anna Kuparinen and Frank M. Schurr, *A flexible modelling framework linking the spatio-temporal dynamics of plant genotypes and populations: Application to gene flow from transgenic forests*, Ecological Modelling **202** (2007), 476–486.
48. Anna Kuparinen, Frank M. Schurr, O. Tackenberg, and Robert B. O'Hara, *Air-mediated pollen flow from genetically modified to conventional crops*, Ecological Applications **17** (2007), 431–440.
49. Anna Kuparinen, Tord Snäll, Simopekka Vänskä, and Robert B. O'Hara, *The role of model selection in describing stochastic ecological processes*, Oikos **116** (2007), 966–974.
50. Kalle Kytölä, *Virasoro module structure of local martingales of* SLE *variants*, Reviews in Mathematical Physics **19** (2007), 455–509.
51. Seppo Laaksonen, *Discussion*, Journal of Official Statistics **23** (2007), 467–475.
52. Seppo Laaksonen, *Weighting for two-phase surveyed data*, Survey Methodology **33** (2007), 121–130.
53. Seppo Laaksonen, *Pondération de données d'enquête recueillies en deux phase*, Survey Methodology = Techniques d'Enquête **33** (2007), 137–147.
54. Jussi Laitila, *Composition operators and vector-valued BMOA*, Integral Equations and Operator Theory **58** (2007), 487–502.

55. Lars Lamberg and Lauri Ylinen, *Two-dimensional tomography with unknown view angles*, Inverse Problems and Imaging **1** (2007), 623–642.
56. Philippe L. Lamy, Imre Toth, Björn J. R. Davidsson, Olivier Groussin, Pedro Gutiérrez, Laurent Jorda, Mikko Kaasalainen, and Stephen C. Lowry, *A portrait of the nucleus of comet* 67P*/Churyumov–Gerasimenko*, Space Science Reviews **128** (2007), 23–66.
57. Markku Lanne and Pentti Saikkonen, *Modeling conditional skewness in stock returns*, The European Journal of Finance **13** (2007), 691–704.
58. Markku Lanne and Pentti Saikkonen, *A multivariate generalized orthogonal factor* GARCH *model*, Journal of Business & Economic Statistics **25** (2007), 61–75.
59. Peter Lynn, Sabine Häder, Siegfried Gabler, and Seppo Laaksonen, *Methods for achieving equivalence of samples in cross-national surveys: The European Social Survey experience*, Journal of Official Statistics **23** (2007), 107-124.
60. Olli Malve, Marko Laine, Heikki Haario, Teija Kirkkala, and Jouko Sarvala, *Bayesian modelling of algal mass occurrences—using adaptive* MCMC *methods with a lake water quality model*, Environmental Modelling & Software **22** (2007), 966–977.
61. A. Marciniak, T. Michałowski, Mikko Kaasalainen, J. Ďurech, et al, *Photometry and models of selected main-belt asteroids.* IV. 184 *Dejopeja,* 276 *Adelheid,* 556 *Phyllis*, Astronomy and Astrophysics **473** (2007), 633–639.
62. Olli Martio, Vladimir Miklyukov, and Matti Vuorinen, *On quasiplanes in Euclidean spaces*, Proceedings of the American Mathematical Society **135** (2007), 2433–2442.
63. Olli Martio, Vladimir Miklyukov, and Matti Vuorinen, *Removable singularities of $\mathcal{WJ}$-differential forms and quasiregular mappings*, Boundary Value Problems **Art. ID 61602** (2007), 9 pp.
64. Olli Martio and C. Sbordone, *Quasiminimizers in one dimension: integrability of the derivative, inverse function and obstacle problems*, Annali di Matematica Pura ed Applicata **186** (2007), 579–590.
65. Jouko Mickelsson and Sylvie Paycha, *Renormalised Chern–Weil forms associated with families of Dirac operators*, Journal of Geometry and Physics **57** (2007), 1789–1814.
66. Jouko Mickelsson and Juha-Pekka Pellonpää, *Families index theorem in supersymmetric WZW model and twisted K-theory: the $SU(2)$ case*, Communications in Mathematical Physics **271** (2007), 775–789.
67. Adrian I. Nachman, Lassi Päivärinta, and Ari Teirilä, *On imaging obstacles inside inhomogeneous media*, Journal of Functional Analysis **252** (2007), 490–516.
68. Pekka J. Nieminen., *Compact differences of composition operators on Bloch and Lipschitz spaces*, Computational Methods and Function Theory **7** (2007), 325–344.
69. Harri Nyrhinen, *Convex large deviation rate functions under mixtures of linear transformations, with an application to ruin theory*, Stochastic Processes and their Applications **117** (2007), 947–959.
70. E. Juulia Paavonen, Kimmo Vehkalahti, Raija Vanhala, Lennart von Wendt, Taina Nieminen-von Wendt, and Eeva T. Aronen, *Sleep in children with Asperger syndrome*, Journal of Autism and Developmental Disorders **38** (2007), 41–51.
71. Lassi Päivärinta and Valery Serov, *Recovery of jumps and singularities in the multidimensional Schrödinger operator from limited data*, Inverse Problems and Imaging **1** (2007), 525–535.
72. Pentti Saikkonen, *Stability of mixtures of vector autoregressions with autoregressive conditional heteroskedasticity*, Statistica Sinica **17** (2007), 221–239.
73. Mikko Salo, *Recovering first order terms from boundary measurements*, Journal of Physics: Conference Series **73** (2007), art. 012020, 18 pp.
74. Mikko Salo, *Stability for solutions of wave equations with $C^{1,1}$ coefficients*, Inverse Problems and Imaging **1** (2007), 537–556.
75. Mikko J. Sillanpää and Fabian Hoti, *Mapping quantitative trait loci from a single-tail sample of the phenotype distribution including survival data*, Genetics **177** (2007), 2361–2377.
76. Ivan Simeonov, Nely Noykova, and Mats Gyllenberg, *Identification and extremum seeking control of the anaerobic digestion of organic wastes*, Cybernetics and Information Technologies **7** (2007), 73–84.
77. Tord Snäll, Robert B. O'Hara, and Elja Arjas, *A mathematical and statistical framework for modeling dispersal*, Oikos **116** (2007), 1037–1050.

78. Mikko Stenlund, *Construction of whiskers for the quasiperiodically forced pendulum*, Reviews in Mathematical Physics **19** (2007), 823–877.
79. Jari Taskinen, *Asymptotical behaviour of a class of semilinear diffusion equations*, Journal of Evolution Equations **7** (2007), 429–447.
80. Matti Taskinen and Simopekka Vänskä, *Current and charge integral equation formulations and Picard's extended Maxwell system*, IEEE Transactions on Antennas and Propagation **55** (2007), 3495–3503.
81. Margarete Utz, Éva Kisdi, and Michael Doebeli, *Quasi-local competition in stage-structured metapopulations: a new mechanism of pattern formation*, Bulletin of Mathematical Biology **69** (2007), 1649–1672.
82. Jouko Väänänen, *Dependence logic. A new approach to independence friendly logic*, London Mathematical Society Student Texts, vol. 70, Cambridge University Press, Cambridge and New York, 2007, ix+225 pp.
83. Jussi Väisälä, *Quasihyperbolic geometry of domains in Hilbert spaces*, Annales Academiae Scientiarum Fennicae Mathematica **32** (2007), 559–578.
84. Kimmo Vehkalahti, Simo Puntanen, and Lauri Tarkkonen, *Effects of measurement errors in predictor selection of linear regression model*, Computational Statistics & Data Analysis **52** (2007), 1183–1195.
85. Arho Virkki, Olli Polo, Mats Gyllenberg, and Tero Aittokallio, *Can carotid body perfusion act as a respiratory controller?*, Journal of Theoretical Biology **249** (2007), 737–748.
86. Juha Vuolle-Apiala, *Shiga–Watanabe's time inversion property for self-similar diffusion processes*, Statistics & Probability Letters **77** (2007), 920–924.
87. Brian D. Warner, Alan W. Harris, Petr Pravec, Mikko Kaasalainen, and Lance A. M. Benner, *Lightcurve photometry opportunities January–March/April–June/July–September/October–December 2007*, Minor Planet Bulletin **34** (2007), 24–25/50–51/92–94/130–132.

5.2. Conference proceedings

88. Kari Astala, Albert Clop, Joan Mateu, Joan Orobitg, and Ignacio Uriarte-Tuero, *Improved Painlevé removability for bounded planar quasiregular mappings*, Harmonic analysis, partial differential equations, and related topics (Proceedings of the 5th Prairie Analysis Seminar held at Kansas State University, Manhattan, KS, 14.–15.10.2005) / edited by Estela A. Gavosto, Marianne K. Korten, Charles N. Moore, and Rodolfo H. Torres), Contemporary Mathematics, vol. 428, American Mathematical Society, Providence, RI, 2007, pp. 1–12.
89. Balder ten Cate, Johan van Benthem, and Jouko Väänänen, *Lindström theorems for fragments of first order logic*, Proceedngs of the 22nd Annual IEEE Symposium on Logic in Computer Science (12.–14.7.2007, Wrocław, Poland), IEEE Computer Society, Los Alamitos, CA, 2007, pp. 280–292.
90. J. Ďurech, P. Scheirich, Mikko Kaasalainen, T. Grav, R. Jedicke, and L. Denneau, *Physical models of asteroids from sparse photometric data*, Proceedings of the IAU Symposium 236: Near Earth Objects, our Celestial Neighbors: Opportunity and Risk (14.–18.8.2006, Prague, Czech Republic), Cambridge University Press, Cambridge, UK, 2007, pp. 191–200.
91. Dario Gasbarra, Tommi Sottinen, and Esko Valkeila, *Gaussian bridges*, Stochastic analysis and applications, Proceedings of the Second Abel Symposium 2005 (Oslo 29.7.–4.8.2005), held in honor of Kiyosi Itô, Springer, Berlin–Heidelberg, 2007, pp. 361–382.
92. Mats Gyllenberg, *Does modelling of complex biological systems require new types of mathematics?*, Systems biology: a grand challenge for Europe, European Science Foundation, IREG, Strasbourg, 2007, pp. 16–18.
93. Ilkka Holopainen and Pekka Pankka, *p-Laplace operator, quasiregular mappings, and Picard-type theorems*, Proceedings of the International Workshop on Quasiconformal Mappings and their Applications (27.12.2005–1.1.2006, Madras) / edited by S. Ponnusamy, T. Sugawa, and M. Vuorinen, Narosa Publishing House, New Delhi–Chennai–Mumbai–Kolkata, 2007, pp. 117–150.
94. Tuomas Hytönen, *Aspects of probabilistic Littlewood–Paley theory in Banach spaces*, Banach spaces and their applications in analysis (Proceedings of the International Conference, Miami University, Oxford, OH, USA, May 22–27, 2006, in honor of Nigel Kalton's 60th birthday / edited by Beata Randrianantoanina et al., Walter de Gruyter, Berlin, 2007, pp. 343–355.

95. Tuomas Hytönen, *Vector-valued singular integrals, and the border between the one-parameter and the multi-parameter theories*, Proceedings of the CMA/AMSI Research Symposium "Asymptotic Geometric Analysis, Harmonic Analysis, and Related Topics" (Murramarang, 21.–24.2.2006), Australian National University, Centre for Mathematics and its Applications, Canberra, Australia, 2007, pp. 11–41.
96. Mikko Kaasalainen and J. Ďurech, *Inverse problems of NEO photometry: Imaging the NEO population*, Proceedings of the IAU Symposium 236: Near Earth Objects, our Celestial Neighbors: Opportunity and Risk (14.–18.8.2006, Prague, Czech Republic), Cambridge University Press, Cambridge, UK, 2007, pp. 151–166.
97. Seppo Laaksonen, *Towards a mixed sampling design in household surveys*, Bulletin of the 56th Session of the International Statistical Institute (22.–29.8.2007, Lisbon, Portugal), Lisbon, 2007, 4 pp.
98. Henri Lindén, *Hyperbolic-type metrics*, Proceedings of the International Workshop on Quasiconformal Mappings and their Applications (27.12.2005–1.1.2006, Madras) / edited by S. Ponnusamy, T. Sugawa, and M. Vuorinen, Narosa Publishing House, New Delhi–Chennai–Mumbai–Kolkata, 2007, pp. 151–164.
99. Olli Martio, *Quasiminimizers and potential theory*, Proceedings of the International Workshop on Quasiconformal Mappings and their Applications (27.12.2005–1.1.2006, Madras) / edited by S. Ponnusamy, T. Sugawa, and M. Vuorinen, Narosa Publishing House, New Delhi–Chennai–Mumbai–Kolkata, 2007, pp. 189–206.
100. T. G. Müller, T. Sekiguchi, Mikko Kaasalainen, M. Abe, and S. Hasegawa, *Itokawa: The power of ground-based mid-infrared observations*, Proceedings of the IAU Symposium 236: Near Earth Objects, our Celestial Neighbors: Opportunity and Risk (14.–18.8.2006, Prague, Czech Republic), Cambridge University Press, Cambridge, UK, 2007, pp. 261–266.
101. Esa Rahtu, Mikko Salo, and Janne Heikkilä, *Nonlinear functionals in the construction of multiscale affine invariants*, Image analysis, Proceedings of the 15th Scandinavian Conference on Image Analysis (Aalborg, Denmark, 10.–14.6.2007), Springer, Berlin–Heidelberg, 2007, pp. 482–491.

5.3. Preprints and working papers

102. Alan L. Carey, Jouko Mickelsson, and Bai-Ling Wang, *Differential twisted K-theory and its applications*, http://arxiv.org/abs/0708.3114 (2007), 39 pp.
103. Albert Clop and Ignacio Uriarte-Tuero, *Sharp nonremovability examples for Hölder continuous quasiregular mappings in the plane*, Reports in Mathematics / Department of Mathematics and Statistics, University of Helsinki **468** (2007), 19 pp.
104. Şerban Costea, *Besov capacity and Hausdorff measures in metric measure spaces*, Reports in Mathematics / Department of Mathematics and Statistics, University of Helsinki **467** (2007), 25 pp.
105. Şerban Costea, *Sobolev capacity and Hausdorff measures in metric measure spaces*, Reports in Mathematics / Department of Mathematics and Statistics, University of Helsinki **469** (2007), 15 pp.
106. Lars Diening, Petteri Harjulehto, Peter Hästö, Yoshihiro Mizuta, and Tetsu Shimomura, *Maximal functions in variable exponent spaces: limiting cases of the exponent*, Reports in Mathematics / Department of Mathematics and Statistics, University of Helsinki **465** (2007), 20 pp.
107. Oleksiy Dovgoshey and Olli Martio, *Some questions and remarks on the basic covering theorem*, Reports in Mathematics / Department of Mathematics and Statistics, University of Helsinki **451** (2007), 11 pp.
108. Oleksiy Dovgoshey and Olli Martio, *On the distortion coefficient in the basic covering theorem*, Reports in Mathematics / Department of Mathematics and Statistics, University of Helsinki **456** (2007), 24 pp.
109. David Drasin and Yûsuke Okuyama, *Singularities of Schröder maps and unhyperbolicity of rational functions*, arXiv:0704.3309v2 (2007).
110. V. N. Dubinin and Matti Vuorinen, *Robin functions and distortion theorems for regular mappings*, Reports in Mathematics / Department of Mathematics and Statistics, University of Helsinki **454** (2007), 21 pp.
111. Eva A. Gallardo-Gutiérrez, María J. González, Pekka J. Nieminen, and Eero Saksman, *On the connected component of compact composition operators on the Hardy space*, Reports in

Mathematics / Department of Mathematics and Statistics, University of Helsinki **464** (2007), 15 pp.

112. Céline Jost, *A note on ergodic transformations of self-similar Volterra Gaussian processes*, Reports in Mathematics / Department of Mathematics and Statistics, University of Helsinki **452** (2007), 8 pp.
113. Jussi Laitila, *Isometric composition operators on BMOA*, Reports in Mathematics / Department of Mathematics and Statistics, University of Helsinki **461** (2007), 9 pp.
114. Jussi Laitila, Hans-Olav Tylli, and Maofa Wang, *Composition operators from weak to strong spaces of vector-valued analytic functions*, Reports in Mathematics / Department of Mathematics and Statistics, University of Helsinki **450** (2007), 13 pp.
115. Olli Martio, *Reflection principle for quasiminimizers*, Reports in Mathematics / Department of Mathematics and Statistics, University of Helsinki **459** (2007), 10 pp.
116. Olli Martio, V. M. Miklyukov, and Matti Vuorinen, *Ahlfors theorems for differential forms*, Reports in Mathematics / Department of Mathematics and Statistics, University of Helsinki **455** (2007), 34 pp.
117. Pertti Mattila, *Geometric measure theory on fractals*, Oberwolfach Reports **4** (2007), 1058–1060.
118. S. A. Nazarov, Jan Sokolowski, and Jari Taskinen, *Neumann Laplacian on a domain with tangential components in the boundary*, Reports in Mathematics / Department of Mathematics and Statistics, University of Helsinki **472** (2007), 13 pp.
119. Mikko S. Pakkanen, *Diffusion limits for endogeneous asset price fluctuations in a microstructural market model*, Reports in Mathematics / Department of Mathematics and Statistics, University of Helsinki **470** (2007), 20 pp.
120. István Prause, *A note on distortion of Hausdorff measures under quasiconformal mappings*, Reports in Mathematics / Department of Mathematics and Statistics, University of Helsinki **457** (2007), 5 pp.
121. István Prause, *Flatness properties of quasispheres*, Reports in Mathematics / Department of Mathematics and Statistics, University of Helsinki **458** (2007), 15 pp.
122. Antti Rasila and Tommi Sottinen, *Arbitrage by changing the stock exchange*, Reports in Mathematics / Department of Mathematics and Statistics, University of Helsinki **453** (2007), 5 pp.
123. Vladimir Ryazanov and Ruslan Salimov, *On the mapping theory in metric spaces*, Reports in Mathematics / Department of Mathematics and Statistics, University of Helsinki **466** (2007), 34 pp.
124. Vladimir Ryazanov, Uri Srebro, and Eduard Yakubov, *Extension of Lehto's existence theorem and its consequences*, Reports in Mathematics / Department of Mathematics and Statistics, University of Helsinki **471** (2007), 28 pp.
125. Ruslan Salimov, *Absolute continuity and differentiability of Q-homeomorphisms*, Reports in Mathematics / Department of Mathematics and Statistics, University of Helsinki **463** (2007), 7 pp.
126. Jarno Talponen, *Convex-transitive characterizations of Hilbert spaces*, Reports in Mathematics / Department of Mathematics and Statistics, University of Helsinki **460** (2007), 23 pp.
127. Jarno Talponen, *Convex-transitivity and function spaces*, Reports in Mathematics / Department of Mathematics and Statistics, University of Helsinki **473** (2007), 15 pp.

5.4. Teaching material

128. Pekka Kontkanen, Jukka Lehtonen, Riitta Liira, Kerkko Luosto, Anja Ronkainen, and Sisko Savolainen, *Pyramidi* [9]. *Lukion pitkä matematiikka: trigonometriset funktiot ja lukujonot* (2007), Tammi, Helsinki, 254 pp.
129. Pekka Kontkanen, Jukka Lehtonen, and Kerkko Luosto, *Pyramidi* [13]. *Lukion pitkä matematiikka 13: Differentiaali- ja integraalilaskennan jatkokurssi* (2007), Tammi, Helsinki, 168 pp.
130. Pekka Kontkanen, Jukka Lehtonen, Kerkko Luosto, and Sisko Savolainen, *Pyramidi* [10]. *Lukion pitkä matematiikka: integraalilaskenta* (2007), Tammi, Helsinki, 171 pp.

131. Eemeli Blåsten, *Matematiikkaa Venäjällä*, Solmu **2007**, no. 3, 14–17.
132. Mats Gyllenberg, *Världens matematiskaste språk*, Arkhimedes **2007**, no. 2, 35.
133. Mats Gyllenberg, *Biomatematiikan menestystarinoita* (Opinion), Arkhimedes **2007**, no. 3, 26–28.
134. Mats Gyllenberg, *Var skall man dra gränsen?*, Arkhimedes **2007**, no. 4, 31.
135. Petteri Harjulehto, *Kavaljeeri- ja sotilasprojektiot*, Solmu **2007**, no. 2, 7–9.
136. Juliette Kennedy, *Review: "Kurt Gödel. Das Album—The album"/ by Karl Sigmund, John Dawson and Kurt Mühlberger*, The Mathematical Intelligencer **29** (2007), no. 3, 73–76.
137. Mika Koskenoja, *Matematiikan opettajaksi opiskelusta*, Solmu **2007**, no. 2, 6.
138. Seppo Laaksonen, *Tutkijan etiikka yhä useammin koetuksella*, Kanava **2007**, no. 1, 39–42.
139. Seppo Laaksonen, *Onnellisuus on politiikan tärkein tavoite*, Hyvinvointikatsaus **2007**, no. 4, 55–60.
140. Aatos Lahtinen, *Matematiikan ylioppilaskirjoitus keväällä 2007*, Dimensio **2007**, no. 6, 17–39.
141. Riitta Liira, Elja Arjas, Jukka Kohonen, and Matti Pirinen, *Matematiikkapäivä lukiolaisille ja opettajille — "Satunnaisuus ja todennäköisyys"*, Solmu **2007**, no. 2, 29–31.
142. Jouni Luukkainen (ed.), *Annual Report 2005, Department of Mathematics and Statistics, University of Helsinki*, Helsinki, 2007, 2+46 pp.
143. Jouni Luukkainen (ed.), *Annual Report 2006, Department of Mathematics and Statistics, University of Helsinki*, Helsinki, 2007, 2+49 pp.
144. Olli Martio, *Book review: Harmonic mappings in the plane / Peter Duren, 2004*, Bulletin of the London Mathematical Society **39** (2007), 700–702.
145. Olli Martio, *Matematiikan osaamisesta ja oppimisesta* (Discussion), Arkhimedes **2007**, no. 2, 30–31.
146. Seppo Mustonen, *Kaksi Survo-ristikkoa*, Solmu **2007**, no. 2, 34.
147. Seppo Mustonen, *Vastine Jukka Tuomelan kirjoitukseen "Survo-ristikko ja polynomit"* (Discussion), Arkhimedes **2007**, no. 4, 15.
148. Marjatta Näätänen, *Kalle Väisälän algebran oppikirja*, Solmu **2007**, no. 2, 32–33.
149. Marjatta Näätänen, *Uusista opetussuunnitelmista*, Solmu **2007**, no. 3, 6.
150. Marjatta Näätänen, *Kalle Väisälän algebran oppikirja Solmuun*, Solmu **2007**, no. 3, 6.
151. Marjatta Näätänen, *Unkarista ideoita matematiikan alkuopetukseen*, LukSitko **2007**, no. 1, 53–54.
152. Ilkka Norros, Eero Saksman, and Esko Valkeila, *Pekka Tuominen 1944-2007* (Obituary), Arkhimedes **2007**, no. 5–6, 4–5.
153. Juha Oikkonen, *Reaalilukujen ominaisuudet*, Dimensio **2007**, no. 1, 42–43.
154. Juha Oikkonen, *Kansainvälinen matemaatikkokongressi Madridissa*, Dimensio **2007**, no. 1, 46.
155. Juha Oikkonen, *Kaikki maailman geometriat liittykää yhteen!*, Dimensio **2007**, no. 3, 23–25.
156. Lassi Päivärinta, *Calderón-palkinto Matti Lassakselle* (News), Arkhimedes **2007**, no. 2, 13–14.
157. Kimmo Vehkalahti, *Short book review: Applied statistics using* SPSS*,* STATISTICA*,* MATLAB *and* R*, 2nd edition / Joaquim P. Marques de Sá, 2007*, International Statistical Review **75** (2007), 421–422.
158. Kimmo Vehkalahti, *Short book review: Contributions to probability and statistics: applications and challenges / edited by Peter Brown, Shuangzhe Liu, and Dharmendra Sharma, 2006*, International Statistical Review **75** (2007), 423–424.
159. Kimmo Vehkalahti, *Luvut, num3rot ja kuvat*, Solmu **2007**, no. 2, 10–16.

5.6. Authors

This section contains a list of all researchers either belonging to the personnel or more loosely affiliated to the department who have published papers in Sections 5.1–5.5. The numbers following the names indicate the items in the reference lists authored by these persons.

Elja Arjas 19–20, 77, 141; Heikki Arponen 5; Kari Astala 88; Eemeli Blåsten 131; Albert Clop 88, 103; Jukka Corander 11; Şerban Costea 104–105; Oleksiy

Dovgoshey 107–108; David Drasin 14, 109; V. N. Dubinin 110; Josef Ďurech 15, 39, 61, 90, 96; Mervi Eerola 3, 32, 44; Erik Elfving 4; Hanna Eskola 17; Dario Gasbarra 19–20, 91; Stefan Geritz 17, 21; Vladimir Gutlyanskiĭ 23; Mats Gyllenberg 1, 11–13, 24, 76, 85, 92, 132–134; Heikki Haario 60; Petteri Harjulehto 22, 25–29, 106, 135; Peter Hästö 26–27, 106; Ilkka Holopainen 30–31, 93; Fabian Hoti 75; Tuomas Hytönen 33–37, 94–95; Tapani Hyttinen 38; Céline Jost 112; Mikko Kaasalainen 15, 39, 56, 61, 87, 90, 96, 100; Juliette Kennedy 40, 136; Meeri Kesälä 38; Juha Kinnunen 28–29, 41; Éva Kisdi 21, 42, 81; Jukka Kohonen 141; Mika Koskenoja 26–27, 137; Anna Kuparinen 45–49; Kalle Kytölä 50; Seppo Laaksonen 7, 51–53, 59, 97, 138–139; Aatos Lahtinen 140; Marko Laine 60; Jussi Laitila 54, 113–114; Lars Lamberg 55; Henri Lindén 98; Kerkko Luosto 128–130; Jouni Luukkainen 142–143; Olli Martio 23, 41, 62–64, 99, 107–108, 115–116, 144–145; Pertti Mattila 117; Jouko Mickelsson 65–66, 102; Vladimir Miklyukov 62–63, 116; Seppo Mustonen 146–147; Marjatta Näätänen 148–151; Sergey Nazarov 9, 118; Pekka Nieminen 68, 111; Ilkka Norros 152; Nely Noykova 76; Harri Nyrhinen 69; Robert O'Hara 48–49, 77; Juha Oikkonen 153–155; Yûsuke Okuyama 14, 109; Lassi Päivärinta 10, 67, 71, 156; Mikko Pakkanen 119; Pekka Pankka 93; Matti Pirinen 19–20, 141; István Prause 120–121; Antti Rasila 122; Vladimir Ryazanov 123–124; Pentti Saikkonen 57–58, 72; Eero Saksman 111, 152; Ruslan Salimov 123, 125; Mikko Salo 43, 73–74, 101; Mikko Sillanpää 19–20, 75; Tord Snäll 49, 77; Tommi Sottinen 91, 122; Uri Srebro 124; Mikko Stenlund 78; Jarno Talponen 126–127; Lauri Tarkkonen 84; Matti Taskinen 80; Jari Taskinen 9, 16, 18, 79, 118; Katja Tuhkanen 29; Pekka Tukia 2; Hans-Olav Tylli 114; Ignacio Uriarte-Tuero 88, 103; Margarete Utz 81; Jouko Väänänen 40, 82, 89; Aleksi Vähäkangas 30–31; Jussi Väisälä 83; Esko Valkeila 91, 152; Simopekka Vänskä 49, 80; Kimmo Vehkalahti 6, 70, 84, 157–159; Jani Virtanen 8; Juha Vuolle-Apiala 86; Matti Vuorinen 62–63, 110, 116; Maofa Wang 114; Ping Yan 21; Kari Ylinen 36; Lauri Ylinen 55.

6. Other activities

6.1. Communications in mathematical or statistical meetings

The following are the numbers of communications in mathematical or statistical conferences and other scientific meetings (in parentheses the numbers of talks given in colloquia or seminars abroad) delivered by the personnel of the department in 2007: Elja Arjas 2, Kari Astala 6, Erik Elfving 1, Stefan Geritz 2, Mats Gyllenberg 6, Ilkka Holopainen 1, Ritva Hurri-Syrjänen 3, Tuomas Hytönen 3, Sören Illman 4, Mikko Kaasalainen 7, Juha Kontinen 1, Mika Koskenoja 1, Antti Kupiainen 4, Jussi Laitila 1, Risto Lehtonen 1, Olli Martio 3, Pertti Mattila 5, Jouko Mickelsson 3 (3), Pekka Nieminen 3 (1), Marjatta Näätänen 1, Petr Ondracek 2, Mikko Pakkanen 1, Petteri Piiroinen 1, Odenna Sagizbaeva 3, Pentti Saikkonen 1, Eero Saksman 1, Mikko Salo 4 (2), Mikko Sillanpää 1 (1), Jari Taskinen (1), Hans-Olav Tylli 3, Margarete Utz 3, Kimmo Vehkalahti 5, Lauri Ylinen 1.

These communications total 84 (8). Of the communications 57 (8) were invited talks.

6.2. Visits abroad

The following are the visits of the personnel for working abroad for at least two weeks in 2007.

Kari Astala: University of Syracuse, USA, 15.1.–28.2., 19.11.–11.12.; Institute for Pure and Applied Mathematics, Los Angeles, USA, 12.3.–22.4.

Stefan Geritz: University of Vienna, Austria, 9.6.–16.7.

Mats Gyllenberg: Utrecht University, The Netherlands, 2.–27.4.

Ritva Hurri-Syrjänen: University of Michigan, USA, 18.6.–20.7.

Tuomas Hytönen: Macquarie University, Sydney, Australia, 17.2.–3.3.; Australian National University, Canberra, Australia, 14.3.–19.4.; Instituto de Matemática Aplicada del Litoral, Santa Fe, Argentina, 5.–18.11.

Éva Kisdi: University of Vienna, Austria, 4.6.–16.7.

Juha Kontinen: Institute for Logic, Language and Computation, University of Amsterdam, The Netherlands, 1.2.–30.4.

Antti Kupiainen: UCL Louvain-la-Neuve, Belgium, 14 days; Institut Henri Poincaré, France, 15 days; École Normale Supérieure, Paris, France, 30 days

Pertti Mattila: University of St Andrews, UK, 4.–27.6.; Universities of Hong Kong, Shanghai and Beijing, China, 22.10.–5.11.

Jouko Mickelsson: Australian National University, Canberra, Australia, 22.3.–12.4.; Erwin Schrödinger Institute, Wien, Austria, 3.–15.9.; KTH, Stockholm, Sweden, several times, 20 days

Pekka Nieminen: Nippon Institute of Technology and Niigata University, Japan, 23.2.–12.3.

Pentti Saikkonen: European University Institute, Florence, Italy, 21 days

Yan Ping: University of Science and Technology of China, China, 22.2.–23.3.

6.3. Editing journals

Elja Arjas: Statistics Reviews (USA), executive editor; Genetics (USA), associate editor.

Stefan Geritz: Theory in Biosciences, member of the editorial board.

Mats Gyllenberg: Journal of Mathematical Biology (Germany), editor; Journal of Biological Dynamics (USA), editor; International Journal of Biomathematics, China, editor.

Juha Heikkinen: Scandinavian Journal of Statistics (UK), associate editor.

Éva Kisdi: Evolutionary Ecology Research (USA), editor; Journal of Evolutionary Biology (UK), member of the editorial board; Acta Biotheoretica (The Netherlands), member of the editorial board.

Mika Koskenoja: Annales Academiae Scientiarum Fennicae Mathematica (Finland), editorial secretary; Arkhimedes (Finland), member of the editorial board; Solmu (Finland), editorial secretary.

Antti Kupiainen: Communications in Mathematical Physics (USA), member of the editorial board; Mathematical Physics Electronic Journal (Spain), member of the editorial board; Grundlehren der mathematischen Wissenschaften (Germany), member of the editorial board; Journal of Statistical Physics (USA), member of the editorial board; Reviews in Mathematical Physics (Austria), member of the editorial board.

Olli Lehto: Annales Academiae Scientiarum Fennicae Mathematica (Finland), member of the editorial board.

Risto Lehtonen: Statistics in Transition Journal, guest editor of special issue of December 2007; Statistics in Transition Journal, associate editor; AStA—Advances in Statistical Analysis, member of the editorial board.

Olli Martio: Annales Academiae Scientiarum Fennicae Mathematica (Finland), chief editor; Discrete and Continuous Dynamical Systems – Series B (USA), member of the editorial board; Computational Methods and Function Theory (Germany), member of the editorial board; Ukrainian Mathematical Bulletin (Ukraine), member of the international board; Journal of Function Spaces and Applications (Germany/India), associate editor; Bulletin de la Société des Sciences et des Lettres de Lódz, Série: Recherches sur les Déformations (Poland), member of the editorial board.

Pertti Mattila: Acta Mathematica (Sweden), editor; Annales Academiae Scientiarum Fennicae Mathematica (Finland), member of the editorial board; Publicacions Matemàtiques (Spain), member of the editorial board.

Ville Nurmi: Proceedings of the Twelfth ESSLLI Student Session, chief editor.

Harri Nyrhinen: Scandinavian Actuarial Journal (Sweden), editor.

Robert O'Hara: Journal of Negative Results—Ecology and Evolutionary Biology (Finland), editor.

Juha Oikkonen: Dimensio (Finland), member of the editorial board.

Lassi Päivärinta: Inverse Problems and Imaging (USA), editor-in-chief; Journal of Inverse and Ill-Posed Problems (Germany), member of the editorial board.

Seppo Rickman: Annales Academiae Scientiarum Fennicae Mathematica (Finland), member of the editorial board.

Juha Ruokolainen: Solmu (Finland), editorial secretary.

Pentti Saikkonen: Econometric Theory (UK), co-editor.

Mikko Sillanpää: Theoretical and Applied Genetics (Germany), member of the editorial board.

Pekka Tukia: Annales Academiae Scientiarum Fennicae Mathematica (Finland), member of the editorial board.

6.4. Refereeing for journals

The following are the numbers of appointments to a referee for a mathematical, statistical, or scientific journal or compilation (or, respectively, to a reviewer for an abstract or review journal): Elja Arjas 2, Kari Astala 4, Stefan Geritz 2, Mats Gyllenberg 6, Ilkka Holopainen 8, Tapani Hyttinen 4, Tuomas Hytönen 2 (2), Sören Illman 1, Mikko Kaasalainen 4, Éva Kisdi 13, Henri Lindén 1, Olli Martio 9 (9), Jouko Mickelsson 3 (and one book manuscript refereeing), Harri Nyrhinen 2, Pentti Saikkonen 1, Eero Saksman 4, Mikko Salo 1, Mikko Sillanpää 9, Jari Taskinen 2, Pekka Tukia 4, Hans-Olav Tylli 2 (6) (and one book manuscript refereeing), Yan Ping 3.

These refereeings total 89 (17).

6.5. Managerial duties in scientific and professional organizations

Elja Arjas: Academy of Finland, expert.

Kari Astala: Mittag-Leffler Institute, Sweden, member of the board.

Mats Gyllenberg: European Research Council, expert; Estonian Research Council, Estonia, expert; OECD Global Science Forum on Industrial Mathematics, member of the steering group; European Science Foundation (ESF), Systems Biology Forward Look, member of the steering group; Deutsche Forschungsgesellschaft, expert; Finnish Mathematical Society, president; Academy of Finland, SYSBIO research program, member of the steering group; European Mathematical Society,

Finland, member of the committee for applied mathematics; Arkhimedes journal, Finland, member of the commission.

Åsa Hirvonen: Finnish Mathematical Society, Finland, member of the board, secretary.

Ritva Hurri-Syrjänen: Foundation of mathematics and natural sciences, University of Helsinki, vice chairman.

Sören Illman: Federation of Finnish Learned Societies, substitute member of the board.

Mikko Kaasalainen: Academy of Finland, expert; University of Helsinki, expert; Finnish Centre of Excellence in Inverse Problems, member of the steering group; Tekes/MASI Inversion Problem Project, member of the steering group.

Éva Kisdi: European Society for Mathematical and Theoretical Biology, secretary.

Mika Koskenoja: European Mathematical Society, administrative assistant (monitoring and reporting EU funded EMS events).

Antti Kupiainen: Helsinki Institute of Physics, member of the board of directors; Erwin Schrödinger Institute, Vienna, Austria, member of the scientific advisory board; Service de Physique Théorique, CEA, Saclay, France, Scientific Committee, chairman.

Seppo Laaksonen: International Association of Survey Statisticians, vice president.

Risto Lehtonen: Permanent Steering Committee of the Baltic–Nordic Network on Survey Sampling (Universities of Helsinki, Stockholm, Umeå, Tartu, Latvia, and Vilnius, and Institute of Mathematics and Informatics, Vilnius), member; Statistics Finland, member of the scientific board; Scientific Committee of the Small Area Estimation—SAE2007 Conference, Pisa, September 2007, member; IASS Program Committee of the 56th Session of the International Statistical Institute, Lisbon, August 2007, member; Scientific and Organizing Committees the Second Baltic–Nordic Conference in Survey Sampling, Kuusamo, Finland, June 2007, chairman.

Henri Lindén: Finnish Mathematical Society, member of the board, secretary.

Jouni Luukkainen: The association HYT of the scientists of the University of Helsinki, appointed vice representative.

Olli Martio: ESF PESC Programme: Harmonic and Complex Analysis and its Applications, Norway, member of the board; Israel Science Foundation, expert; Research Council of Norway, expert; Finnish National Committee for Mathematics (IMU), chairman; Mathematics Foundation, Finnish Academy of Science and Letters, chairman of the trustees; Finnish Academy of Science and Letters, Publication Committee, vice chairman; Fulbright Center, Finland, expert; Matriculation Examination Board, member.

Pertti Mattila: Academy of Finland, member of the Research Council for Natural Sciences and Engineering; Finnish Academy of Science and Letters, expert.

Harri Nyrhinen: Astin Colloquium 2009, Scientific committee, member.

Marjatta Näätänen: Finnish Mathematical Society, vice president; European Women in Mathematics (EWM), auditor.

Juha Oikkonen: Survey team of the ICMI on initial education of mathematics at universities for ICME-11 conference, member.

Lassi Päivärinta: Rolf Nevanlinna Institute, support foundation, member of the board of directors.

Mika Seppälä: eContentPlus Program Thematic Network Joining Educational Mathematics (JEM), EU, coordinator; OpenMath Society, Finland, member of the executive committee.

Mikko Sillanpää: Reviewer of an Equipment, Technology Development & Biomedical Resources grant application and of a Wellcome Trust Research grant application, both from the Wellcome Trust, UK.

Jari Taskinen: Finnish Mathematical Society, Finland, member of the board, treasurer; Rolf Nevanlinna Institute, Finland, support foundation, chairman of the board of directors; Slovak Research and Development Agency, Slovakia, expert.

Hans-Olav Tylli: Finnish Graduate School in Mathematical Analysis and Its Applications, chairman of the board; Tuning Educational Structures in Europe, phase IV (European Commission of Culture and Education), Mathematics Subject Group, member.

Jouko Väänänen: Association for Symbolic Logic, Executive Committee, member; Association for Symbolic Logic, Committee on Logic in Europe, member; European Mathematical Society, Finland, member of the executive committee.

6.6. Assessments for appointments

The following are the numbers of assessments for appointments to a professorship or docentship: Kari Astala 1, Mervi Eerola 1, Antti Kupiainen 1, Risto Lehtonen 1, Petri Ola 1, Jari Taskinen 1, Pekka Tukia 1.

6.7. Refereeing Ph.D. theses

Mats Gyllenberg, Pertti Mattila, Pentti Saikkonen, Eero Saksman, and Hans-Olav Tylli have acted as an opponent, and Elja Arjas (three times), Petri Koistinen, Antti Kupiainen, Risto Lehtonen, and Jari Taskinen have acted as a referee.

6.8. Activities in the society

Elja Arjas gave a talk in the Science Forum in January and in the Mathematics days for high school students and teachers.

Aapo Halko has been the organizer of an international web page mscrossroads.org on the MS disease. He has been a member of the editorial board of the mathematics web magazine Solmu.

Alex Hellsten has been the coordinator of the Summamutikka center, which contains the mathematical activities of the LUMA center.

Heikki Junnila has been a member of the board of the Niemi Foundation (Niemisäätiö).

Mikko Kaasalainen gave a talk in the Science Forum. In March he was interviewed in the Finnish television and radio news and in several Finnish newspapers and periodicals about the discovery that the sunlight accelerates the rotation of the Apollo asteroid. Abroad he was interviewed about this subject, or this subject was the topic of articles, for example in BBC, CNN, New York Times, National Geographic, New Scientist, Scientific American, ABC, Reuters, Spiegel, Die Welt, Corriere Della Sera, El Mundo, London Science Museum – Antenna Exhibitions, NBC, etc.; totally in tens of journals and in hundreds of Internet news pages, in tens of countries, in tens of languages.

Juha Kontinen has been a project person in Summamutikka center.

Antti Kupiainen has been a member of the board of the Niilo Helander Foundation. He was interviewed in the Finnish television and radio.

Aatos Lahtinen has contributed to the work of the mathematics section of the Matriculation Examination Board.

Kerkko Luosto is a member of the training group of the Finnish Mathematical Society for high school students and a member of the competition committee of the MAOL association.

Jouni Luukkainen has tried to improve the freedom of thought, conscience, and religion. Because of his criticism in two bills of protest in 2006 to the Parliamentary Ombudsman, the school administrations of the cities of Espoo and Helsinki partly corrected their forms. The Administration Committee of the Parliament of Finland recorded two written statements by him.

Olli Martio participated in a panel discussion about the new form of the mathematics exam in the Matriculation Examination.

Marjatta Näätänen has been a member of the editorial board of the mathematics web magazine Solmu; written several articles, organized translations of foreign material (Hungary, UK, Sweden, France) about math teaching, and taken care of financial affairs and publicity for Solmu. She organized the publishing of the book Algebra by K. Väisälä in Solmu. She has continued her cooperation project with Hungarians. This includes a primary math teaching experiment in several schools in Finland, a yearly math summercamp in Hungary for Finns, and in-service education for primary teachers. She cooperated with lecturer Tuula Matikainen of the University of Lapland and with professor Eira Korpinen and Lauri Kahanpää of the University of Jyväskylä. She has been a member of the planning group for the LUMA center also chairing the mathematics group. She organized two mathematics weekends at Maunula school. In the EU Socrates Minerva project "M-buttons" she had made additions and corrections to the multilingual partly illustrated mathematics web-thesaurus for school level and planned a possible continuation of the project with English and Hungarian colleagues. The department has an equal opportunity project, where Marjatta Näätänen (math) has been active in organizing a seminar, and together with Mervi Eerola (stat) has been conducting two surveys focusing on gender issues, one for graduates and the other for post graduates. The surveys dealt with the students' experiences and expectations of the teaching of mathematics and statistics at the department, and their career prospects. She was interviewed three times in the Finnish media.

Hannu Niemi has been the chairman of the board of directors of the E. J. Sariola Foundation. He has also been a board member and secretary of the Finnish–Lithuanian Culture Foundation and the chairman of the Donelaitis Society – Friends of Lithuania. He has been a member of the Editorial and Advisory Board of the monograph series "On the Boundary of Two Worlds: Identity, Freedom, and Moral Imagination in the Baltics" published by Rodopi Publishing House.

Juha Oikkonen has acted as an auxiliary member of the mathematics section of the Matriculation Examination Board and been a member of the science education committee of the Finnish Science Centre Heureka. He gave two talks on math learning in the Science Forum, one of which with Tiina Rintala, and one talk for math teachers.

Juha Partanen has acted as an auxiliary member of the mathematics section of the Matriculation Examination Board.

Tommi Sottinen has been a member of the editorial board of Solmu.

Hans-Olav Tylli gave a talk in Spain on Bachelor and Master degrees in mathematics and statistics at the University of Helsinki.

Since 1996 a scrapbook containing information about the department and articles of public interest written by persons in the department is maintained in the office.

7. Guests

The following is a list of the foreign guests of the department in 2007.

Aleman, Alexandru, Lund University, Sweden, 4 days
Antonov, Nikolai, Russia, 12.–25.8.
Axelsson, Andreas, University of Stockholm, Sweden, 14.–18.5.
Bauer, Andrea, University of Bonn, Germany, 26.–31.3., 3.–31.5.
Berenstein, Alexander, 8 days
Bojarski, Bogdan, Polish Academy of Sciences, Poland, 22.2.–2.3.
Borodachov, Sergiy, Georgia Tech, USA, 1.–13.10.
Bricmont, Jean, UCL Louvain-la-Neuve, Belgium, 12.–19.5., 10.–15.8.
Chasco, Coro, University of Madrid, Spain
Collamore, Jeffrey, University of Copenhagen, Denmark, 12.–16.2.
Colton, David, University of Delaware, USA, 27.–31.5.
Dovgoshey, Oleksiy, Institute of Applied Mathematics and Mechanics NAS of Ukraine, Ukraine, 20.7.–20.9.
Ďurech, Josef, Charles University, Prague, Czech Republic, 29.1.–9.2., 2.–7.12.
Falk, Kurt, National University Ireland Maynooth, Ireland, 28.10.–4.11.
Filin, Ido, Ben Gurion University, Israel, 12.–14.12.
Foertsch, Thomas, University of Bonn, Germany, 22.–27.5.
Galindo, Jorge, Universidad Jaume I, Castellon, Spain, 5.–6.9.
Gogatishvili, Amiran, Charles University, Prag, Czech Republic, 18.–26.5.
Grillo, Gabriele, Politecnico di Torino, Italy, 28.–31.5.
Iwaniec, Tadeusz, University of Syracuse, USA, one week in May and one in August
Kaiser, Cornelia, Universität Karlsruhe, Germany, 20.–30.8.
Kirby, Jonathan, one day
Koeller, Amos, University of Tübingen, Germany, 16.9.–14.10.
Leonardi, Gian Paolo, University of Modena, Italy, 5 days in May
Lusky, Wolfgang, Universität Paderborn, Germany, 18.–25.3.
Martin, Gaven, one week in August
Mehlig, Bernhard, University of Gothenburg, Sweden, 5 days
Melnikov, Mark, Universitat Autònoma de Barcelona, Spain, 20.–29.8.
Metz, J. A. J., University of Leiden, The Netherlands, 5.–9.2., 1.–9.3., 1.–5.10.
Nakanishi, Toshihiro, Shimane University, Japan, 20.–28.8.
Nazarov, Sergey, Steklov Institute, St. Petersburg, Russia, 27.1.–11.2., 19.9.–2.10.
Olla, Piero, Italy, 30 days
Paramonov, Petr, Moscow State University, Russia, 23.9.–23.12.
Portal, Pierre, Université Lille 1, France, 1.–25.8.
Potyemkin, Vladimir, Institute of Applied Mathematics and Mechanics NAS of Ukraine, Ukraine, 15.8–20.9.
Preiss, David, University of Warwick, UK, 20.–31.8.
Rendtel, Ulrich, Freie Universität Berlin, Germany

Rogers, Keith, University (Autonoma) of Madrid, Spain, 18.–19.3.

Ryazanov, Vladimir, Institute of Applied Mathematics and Mechanics NAS of Ukraine, Ukraine, 15.8.–20.9.

Särndal, Carl-Erik, University of Montreal, Canada

Tao Kian, University of Macau, China, 3.–8.8.

Zemanek, Jaroslav, Polish Academy of Sciences, Institute of Mathematics, Poland, 18.1.

Yong Lin, University of Beijing Remn, China, 20.8.–1.9.

Of these 43 guests seven, namely Bauer, Dovgoshey, Nazarov, Olla, Paramonov, Potyemkin, and Ryazanov stayed at least one month.

8. Library

At the beginning of March 2001 the Library of the Department of Mathematics was incorporated with other libraries of the exact sciences in the faculty to form the Kumpula Science Library. The Library of Mathematics stayed in Heimola with the department until they moved together to Kumpula during the spring and summer 2004. Also the main collection of journals and books (about 100 shelfmeters) from the Department of Statistics moved to the Kumpula Science Library.

The collection of mathematics in Kumpula is the only one containing advanced mathematical literature at the University of Helsinki. This collection covers a wide range in the fields of mathematics. It is considered to be of a very high international standard (especially the journals). In 2007 the acquisitions in mathematics and statistics were exclusively funded by the department. In 2007 the accumulation of the bought new mathematical or statistical books was 129 copies, and the whole library received around 1200 titles of periodicals and reports, from which about 250 were in mathematics and statistics. Over 250 titles in mathematics or statistics are available in digital form (e.g. Academic Press, AMS, Elsevier, Springer-Verlag), mostly through FinELib (a national electronic database). The most important reference database in mathematics is the "MathSciNet".

The book and journal catalogues are part of the electronic HELKA- and LINDA-databases. Because the books have been catalogued into HELKA-database, they can be borrowed automatically with HELKA-, Lyyra- or UniCard. The serials check-in is carried out using the Voyager program.

The ARTO database is being upkept in the library. ARTO contains information on articles either published by Finnish authors or published in Finnish journals. Also the database JULKI (Publication database) of the University of Helsinki is updated by the library.

The core customers consists of teachers and researchers at the department, as well as of graduate students and advanced undergraduate students, and of the mathematical and statistical departments of other Finnish universities. The opening hours have been 9–18 during the semesters and 9–16 off semesters, Monday through Friday. The staff of the department has round-the-clock access to the library.

9. Computing facilities

The department has about 260 PC computers and 25 Macintosh computers, which are all connected to the university network. For output there are 20 laser

printers. The computers are mainly used for word processing, typesetting, and communication by electronic mail, but some mathematical and statistical programs are used as well. The laboratory engineer of the department supports the equipment and consults the staff in automatic data processing. Students can use a microcomputer classroom, which has 25 PC computers and one laser printer. The students and the staff of the department have about 770 accounts on the UNIX machines and about 1500 accounts on the Novell networks of the university.

10. Administration

The administrative posts on the university, faculty, or department level held by members of the department in 2007 were the following. If a name is followed by a name in parentheses, the latter person had been elected to replace the first person when needed.

Election Collegium. Hannu Niemi and Lassi Päivärinta were members.

Board of directors of the National Library of Finland. Hannu Niemi was the chairman.

Board of directors of the Open University / University of Helsinki. Hannu Niemi was the chairman.

Steering group for the Internet services of the Finnish Open University. Hannu Niemi was the chairman.

Campus council for the City Centre Campus. Hannu Niemi was a member.

Faculty Council (Faculty of Science). Members in the quota of professors were Mats Gyllenberg (Lassi Päivärinta) and Olli Martio (Pertti Mattila).

Faculty Council (Faculty of Social Sciences). Hannu Niemi was the dean of the faculty.

Faculty planning board (Faculty of Science). Olli Martio was a member.

Faculty entrance board (Faculty of Science). Hannu Honkasalo was a member. Pekka Tukia was a member until 11.5.2007, when he was replaced by Jari Taskinen. Mikko Salminen was a student member.

Faculty entrance board (Faculty of Social Sciences). Maria Valaste was a member.

Postgraduate student entrance board (Faculty of Social Sciences). Hannu Niemi was a member.

Subject-teacher student entrance board in the Faculties of Science, Biosciences, and Behavioural Sciences. Juha Partanen (Olli Martio) was a member.

Teaching development board in the Faculty of Science. Juha Oikkonen was a member.

Teaching development board in the Faculty of Social Sciences. Kimmo Vehkalahti was a member.

Scientific experts group in the Faculty of Science. Mats Gyllenberg was a member.

Communication group in the Faculty of Science. Mats Gyllenberg was a member.

Research and postgraduate committee in the Faculty of Social Sciences. Seppo Laaksonen was a member.

International affairs committee in the Faculty of Social Sciences. Risto Lehtonen was a member.

Chairman. The chairman of the department was Olli Martio. The first vice chairman was Mats Gyllenberg and the second vice chairman was Pentti Saikkonen.

Department Board. The four members of the department board from the quota of professors were Olli Martio (Jouko Mickelsson), Pertti Mattila (Kari Astala), Hannu Niemi (Pentti Saikkonen), and Lassi Päivärinta (Mats Gyllenberg). The four members from the quota of other personnel were Antti Kemppainen (Kalle Böss), Pekka Pere (Maria Valaste), Hans-Olav Tylli (Dario Gasbarra), and Riitta Ulmanen (Martti Nikunen). The four members from the quota of students were Teemu Kujala (Jouni Haapakoski), Jaakko Mali (Mikko Salminen), Piia Nissinen (Susanna Oksanen), and Suvi Silfverberg (Petri Peltonen). The member Suvi Silfverberg (Petri Peltonen) was replaced by Petri Peltonen (Auli Hämäläinen) from 13.11. on. The vice member Kalle Böss was replaced by Åsa Hirvonen from 29.11. on. Martti Nikunen resigned from 1.12. on. The board was chaired by the chairman of the department.

Kumpula Science Library board. Ilkka Holopainen (Pertti Mattila) was a member.

Subject-teacher student evaluation board in mathematics. The members were Erik Elfving, Alex Hellsten, and Taneli Huuskonen.

11. Economy

The expenses covered directly by the department can be divided into the following ten parts:

— The salaries of the regular staff.
— The salaries of the graduate school students.
— The activities of the Centres of Excellence.
— Teaching fee allocation (the salaries of the instructors and the teaching assistants).
— The acquisitions of the library: books, periodicals, and CD-ROMs.
— Research: reports.
— Travels and scholarships.
— Computers: microcomputers, printers, computer software etc.
— Rents.
— Mixed expenditure (this includes, e.g., mailing, telephone, telefax, photocopy paper).

The following table gives these costs in thousands of euros in the last four years. The figures are presented in two columns A and B per year concerning the Faculty of Science and the Faculty of Social Sciences, respectively.

Year	2004A	2004B	2005A	2005B	2006A	2006B	2007A	2007B
Salaries	2465	526	2514	566	2386	660	2190	620
Gr. schools	244	0	145	0	331	24	489	0
Centres of Ex.	215	0	344	0	144	0	183	0
Teaching	373	79	330	67	302	64	310	74
Library	90	2	103	1	117	5	103	7
Research	8	0	10	0	6	0	7	0
Travels	56	2	11	4	11	2	14	5
Computers	60	4	29	4	30	0	19	0
Rents			684		644	115	639	121
Mixed	45	15	40	10	28	14	43	10
Total	3556	628	4209	652	3999	884	3997	837

The external funding in 2007 for the department concerning the Faculty of Science amounted to 3.801 million euros, of which 2.874 million euros came from the Academy of Finland and 294000 euros from the EU. In 2006 these figures were 2.75 million euros, 1.77 million euros, and 477000 euros, respectively, whereas in 2005 these figures were 2.65 million euros, 1.57 million euros, and 291000 euros, respectively, and in 2004 these figures were 2.31 million euros, 1.63 million euros, and 119000 euros, respectively. Concerning the Faculty of Social Sciences, the external funding in 2007 amounted to 36000 euros, of which 4000 euros came from the Academy of Finland; in 2005–2006 there was no funding from the Academy of Finland, but 60000 euros in 2004.

12. Premises

In July 2004 the department moved from different locations to premises in Kumpula Campus. The new Exactum building (Gustaf Hällströmin katu 2b) with its four wings offers in its third and fourth floors a unified space for the new unified department. The premises consist of 98 offices, totally 1377 m^2, and 13 rooms in general use, totally 219 m^2. That is, 111 rooms altogether, totally 1596 m^2. In the first floor there are three additional offices for researchers, totally 45 m^2, and in the basement two stock rooms, totally 40 m^2, or, in fact, also a major part of a third one with 50,5 m^2.

In Exactum the department is the sole or the major user of 11 teaching halls with totally 362 seats and two microcomputer rooms with totally 43 seats. The department shares the use of the three auditoriums of Exactum with totally 568 seats.

The department also has two offices in the premises of the Faculty of Social Sciences (Unioninkatu 37).