

UNIVERSITY OF DUISBURG-ESSEN:
A STRONG PARTNER IN RESEARCH AND EDUCATION

Information for Candidates
applying for the
Chair of NUMBER THEORY
at the
Institute for Experimental Mathematics
of the
Faculty of MATHEMATICS

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I. THE UNIVERSITY OF DUISBURG-ESSEN

UNIVERSITY OF DUISBURG-ESSEN: A STRONG PARTNER IN RESEARCH AND EDUCATION

The University of Duisburg-Essen is located in a region boasting the highest concentration of universities in Europe. Some 33,700 students are enrolled here and, with a total 3,640 academic and non-academic staff members, the university clearly occupies an important position among employers in the region. Established on January 1, 2003, the result of the merger between two previously independent institutions – the University of Duisburg and the University of Essen (both of which were first founded in 1972) – the U of D-E is the youngest university in North Rhine-Westphalia.

This new twin-campus university in the center of the Rhine-Ruhr region has made good use of opportunities given to strengthen and showcase its research and teaching potential, a potential recognized well beyond the borders of the region. Offering a broad range of subjects, the U of D-E has already notched up a good name for itself — in fields as disparate as social sciences, economics, the humanities, design, engineering and natural sciences, including medicine.

Students can graduate on the basis of the traditional degree structure in education and medicine. Or they can obtain a new Bachelor's or Master's degree in a growing number of disciplines. A high priority is given to expanding these consecutive – mainly interdisciplinary – courses since they meet international standards and attract students from far and near. Furthermore, the University offers working professionals ("mature students") a number of attractive courses which, thanks to the modern integrated e-learning methods on offer, are geared to the learning speed of the individual student.

The University has four main research areas:

- nanosciences
- genetic medicine and medical biotechnology
- urban systems, logistics and transport, and
- empirical education research.

Staff here are fortunate in being able to draw on the excellent work carried out in the past by numerous research groups.

Due to various projects focusing on both pure research and practical applications in nanotechnology, the U of D-E has also gained an enviable reputation throughout Germany and further afield. This is a key area in which the University aims to become the top-ranked university in North-Rhine Westphalia and thus establish itself over the coming decades. The chances of success are excellent: four special research programs and two postgraduate programs are dedicated to the nanosciences. Research on smart materials, for example, is particularly exciting -- materials that can "remember" their original form and thus open up new perspectives in the world of control engineering. Materials with tailor-made optical, electronic, magnetic and mechanical properties also play a major role in the fundamental changes that traditional production processes are undergoing.

Research in the field of genetic medicine includes the subject of genetic diagnostics. The aim: to help doctors assess morbidity risks and predict the course the diseases may take.

Activities here include the study of different kinds of reaction to pharmaceuticals. In much the same way, the University is increasingly attempting to forge links with representatives from the faculties of physics, chemistry and engineering sciences — and go beyond the traditional bond between medicine and biology. In the newly founded Center of Medical Biotechnology, the focal points of interdisciplinary studies are: tumor research, tissue and organ replacement, molecular recognition and digital image recognition.

With the U of D-E situated in one of Europe's largest conurbations, our engineers, economists, natural scientists and social scientists are looking into the future of urban systems and working on feasible concepts for the sustainable development of the human habitat within the context of the structural transformation, the modernization, of the Ruhr as a whole. For this purpose, we need to merge the many ecological, economic and sociological points of view into a holistic viewpoint and develop viable political strategies. Some of the key areas on which our many research teams are currently focusing their activities are: urban traffic planning, mobility patterns in passenger and freight traffic, an intelligent integration of waste and traffic management into urban infrastructure, and water quality assessment on a reliable basis.



Meanwhile, staff from the fields of empirical education research, teaching methodology and educational psychology are working on the development of a more competitive education system in Germany — this being a widely discussed topic since the recent PISA survey. The University, which is one of North-Rhine Westphalia's leading centers for teacher training anyway, is also a center of educational research, a fact neatly illustrated by the unique support we get from the German Science Foundation. The Foundation is hoping that the simultaneous set-up of a research unit and a postgraduate program will soon yield significant results.

U of D-E institutes – and a cluster of institutes in the vicinity – already have impressive results to show by way of practice-oriented projects, with support coming not just from the engineering department but also from the humanities and the social sciences. Yet more proof of the University's commitment to the "real world" can be seen in the number of tasks being taken on in the continuing education sector. Indeed, we have set up our own special institute with a wide and varied curriculum in terms of vocational qualifications.

During its founding phase, the University's innovative management also attracted a large amount of attention mainly because of the broad-based project approach taken to quality development. All the faculties and central institutions of the University have their products, services and processes regularly reviewed by the University's own Center for University and Quality Development. Leading the way on the first round of evaluation were the University Library, the Rector's Office and the Faculty of Social Sciences.

II. THE FACULTY OF MATHEMATICS

The Faculty of Mathematics is located on both campi, Duisburg and Essen. It guarantees its students the possibility to study towards a full Bachelor- or Masterdegree on each campus, without the necessity to visit the other one. However, the students might profit from a wider offer concerning courses visiting both campi. Normally, a member of the teaching personnel is supposed to teach only at one of the campi, too.

The faculty offers following studies: the Bachelor- and Masterdegrees can be obtained on both campi, in Essen teaching qualification for all school-forms can be obtained, too. In Duisburg students can choose to concentrate their studies on the subject Techno-Mathematics or Business Mathematics. It is possible to study towards a Ph. D. on both campi, also for international students, with help of the International Graduate School of Mathematics (IGS).

The Faculty of Mathematics also does service courses in other departments, such as Chemistry, Physics, Economy, etc.

The scientific staff of the faculty does research work in 26 working groups with following main areas:

- Algebra/Geometry/Number theory
- Analysis: Differential equations/Optimization
- Numerics
- Stochastics
- Didactics of Mathematics

The internationally accepted Institute for Experimental Mathematics (Institut für Experimentelle Mathematik, IEM) has a strong relationship with the faculty and cooperates with it.

The quality of the faculty's research activity is documented through the successful participation in highly competitive programs of the DFG (Deutsche Forschungsgemeinschaft) and the BMBF (Bundesministerium für Bildung und Forschung) for third-party funds. Especially the DFG's Transregio-project 45 "Periods, moduli spaces and arithmetic of algebraic varieties" and the research area "Komplexitätsreduktion in multivariaten Datenstrukturen" should be mentioned. In 2006, the faculty of Mathematics of the University Duisburg-Essen held rank 7 in the DFG's research ranking.

Momentarily, a number of Professorships in the faculty are vacant and we experience a generation shift. We intend to use this process to create a new research area "Applied Analysis/Numerics", which shall be located on both campi, out of the old main research areas Analysis and Numerics. The new research field is intended to be interdisciplinary and may bring forth research cooperation with other faculties.

Normally, a lot of students quit studying mathematics during the first semesters (especially students wanting to become teachers). The faculty strives to lessen this number and created a center for individual consultation and support, the LuDi (Lern- und Diskussionszentrum Mathematik – Learn- and Discussioncenter Mathematics). The results of a first survey show, that the students highly appreciate the LuDi and it is always well-attended.

III. THE INSTITUTE FOR EXPERIMENTAL MATHEMATICS (IEM)

The institute serves to promote research in mathematics and to strengthen the interaction between mathematics, computer science and engineering. In particular, this concerns the following areas:

1. Fundamental research in mathematics;
2. Algorithmic aspects in Discrete Mathematics, Algebra and Number Theory, as well as Scientific Computing;
3. Electronic communication as well as secure and fast data transfer.

Main tasks of the IEM are interdisciplinary research and the training of young scientists.

The IEM supports interdisciplinary projects in connection with the above mentioned areas in order to create a main research profile for the University of Duisburg-Essen. These projects take place with university as well as non-university, national as well as international research groups.

The interdisciplinary conception of the IEM allows a close co-operation of mathematicians, engineers and computer scientists which has the distinction of being a balanced mixture of fundamental and applied research. Thus it offers best conditions for a fast exploitation of research results.

The members of the IEM are very active in the national in international research community. This is documented by

- Initiation of and participation in the organization of international workshops and conferences;
- Exchange and participation in international Graduate Schools;
- Participation in programs of ERASMUS, DAAD (Deutscher Akademischer Austausch Dienst) and the Humboldt foundation;
- Participation in European projects such as COST, Ecrypt, EU-training programs (RTM) and Networks of Excellence;
- Participation in collaborative research centres (CRC);
- International co-operation with a number of universities and research institutions in the USA, Canada, South Africa, South Korea and the Netherlands.

The IEM offers productive surroundings for the promotion of young scientists. Achievements in this aspect are documented by many PhDs and appointments to professorships of former members of the institute. This environment and a number of successes stimulate the international exchange. This is also reflected in an extensive guests program.

IV. NUMBER THEORY AT THE IEM AND AS PART OF THE FACULTY OF MATHEMATICS

The research group Number Theory at the IEM concentrates on Arithmetic Geometry, one of the most modern and latest areas of Number Theory. Because of this focus it is intimately involved in the main research area of the faculty of Mathematics which is formed by the research groups Analytic Geometry (Chair Prof. Esnault), Algebraic Geometry (Chair Prof. Viehweg) and Arithmetic Geometry (Chair Prof. Böckle). Through collective projects in research and education the outstanding position of the mentioned research groups is strengthened in Germany and beyond. This is for example documented by the collaborative research centre “Sonderforschungsbereich Transregio 45”, which belongs to the area of Arithmetic and Algebraic Geometry. The research group Number Theory is further participating in the European Network “Galois Theory and Explicit Methods 2”.

V. JOB REQUIREMENTS/DESCRIPTION OF THE CHAIR

1. Research activity

The research activities of the applicant should have their focus on Arithmetic Geometry. Interest in algorithmic questions as well as in applications, for instance to cryptography, is expected.

2. Teaching

The holder of the position is expected to teach 9 hours per week each semester. He/she has to participate in the teaching of the IEM and the Faculty of Mathematics, including service courses in other faculties.

3. Further requirements

The holder of the position is expected to be willing to collaborate with neighbouring research areas in the Faculty of Mathematics and the IEM as well as to become involved in projects funded by Third Parties, in particular the SFB/TR 45. He/she should contribute to the profile of the IEM and commit himself/herself to the training of PhD students at the IEM.

VI. STAFFING AND FACILITIES

The facilities of the position, including assistance personal, is subject of the negotiations for the calling.

The holder of the Professorship participates in the existent premises and technical facilities. According to the valid distribution basis the holder of the position has a share in the available current funds of the IEM.

VII. LEGAL FRAMEWORK

With the passing of the Higher Education in North-Westphalia Act (German abbreviation: HG) dated 31.10.2006, the university system was radically restructured as of 1 January 2007.

Operating under German law, the universities are defined legally as public corporations supported by the State of North Rhine-Westphalia. State finance is based on the tasks of the universities, agreed goals and performances delivered. They have a global budget and are not subject to the instructions of the North Rhine-Westphalian Ministry of Innovation, Science, Research and Technology.

Legal status of the academic staff

Assuming legal prerequisites are met, professors in Germany are usually employed on a civil-servant basis (= full tenure). However, employment on the basis of a contract under private law is also possible.

Junior professors can receive civil-servant status for the duration of three years. That civil-service contract may be extended for a further period of three years in the course of the third year, assuming the agreement of the junior professor and assuming that he or she has shown his or her worth as a university teacher. Otherwise, the civil-servant status can be extended for the duration of up to one year, assuming the agreement of the junior professor. In the course of the sixth year, the civil-servant status of the junior professor can be extended for a further period of three years, assuming the agreement of the junior professor and assuming that he or she has shown his or her worth as a university teacher. Junior professors may also be employed on the basis of a contract under private law.

For further information (laws, directives etc.), please visit http://www.uni-due.de/zentralverwaltung/dez4_1_0.shtml

VIII. SALARY

Effective January, 1, 2005, the C salary scale that used to apply in Germany to all newly appointed professors made way for a performance-oriented salary scale. As such, the new salary scale is part of a recent conditions-of-service reform. The formerly standard seniority grades were replaced by a W salary scale (where W in German stands for *Wissenschaft* or "science") that provided for a system of basic salaries (W2, W3) plus "performance bonuses". As of January 1, 2005, then, the W salary scale thus applies to all newly appointed professors and to those who transfer to the W salary scale.

Special arrangements apply to junior professors assigned to the W1 salary scale.

For professors on either W2 or W3 pay scales, monthly basic salaries of € 3,890.03 (W2) and € 4,723,61 (W3) were legally set in 2004.

Provision is also made for performance-related salary components — "performance bonuses". These can be allocated on different grounds: as the result of appointment and tenure negotiations ("appointment and tenure bonuses"), for special achievements in research, teaching, art, continuing education and next-generation staff development ("special performance bonuses") and for carrying out functional or special responsibilities within the framework of university self-management or university administration ("functional performance bonuses"). Furthermore, under certain circumstances, research and teaching allowances may be paid from third-party funds.

Within the framework of appointment negotiations, any appointment-related performance bonuses are to be negotiated on an individual basis with the Rector of the University of Duisburg-Essen.

Similarly, within the framework of appointment negotiations, any appointment-related performance bonuses are to be negotiated on an individual basis with the Rector of the University of Duisburg-Essen.

More information, both general and legal, about the W salary scale can be found on the Internet at:

<http://www.uni-duisburg-essen.de/zentralverwaltung/professorenbesoldungsreform.shtml> (in German)

<http://www.hochschulverband.de/cms/index.php?id=296> (in German)

Appendix: job advertisement

The **Institute for Experimental Mathematics (IEM)** of the **University of Duisburg-Essen, Campus Essen**, invites applications for the following open position:

Full Professorship (W3 BBesG) in Number Theory

The position is associated with the Faculty of Mathematics (Campus Essen).

Tasks:

Representation of "Number Theory" in research and teaching. The research activities of the applicant should have their focus on Arithmetic Geometry. Interest in algorithmic questions as well as in applications, for instance to cryptography, is expected.

The holder of the position has to participate in the teaching of the IEM and the Faculty of Mathematics, including service courses in other faculties. He/She is expected to be willing to collaborate with neighbouring research areas in the Faculty of Mathematics and the IEM as well as to become involved in projects funded by Third Parties, in particular the SFB/TR 45. The holder of the position should contribute to the profile of the IEM and commit himself/herself to the training of PhD students at the IEM.

Requirements:

The requirements are according to German university regulations (§ 46 Hochschulgesetz NRW).

The University of Duisburg-Essen is an equal opportunity employer and particularly welcomes applications from suitably qualified women.

Physically handicapped persons with equivalent qualifications, competence and achievements will be considered preferentially.

Starting date of the position: 15th September 2009

Deadline for applications: 15th May 2008

Applications, together with the usual supporting documents (Curriculum vitae, list of academic publications, evidence of academic and professional background, certified copies of examination certificates, details of previous teaching activities and of participation in university committees) are to be submitted within a month after publication of this advertisement to **University of Duisburg-Essen, Dean of the Fachbereich Mathematik, Prof. Dr. Hans Niels Jahnke, Universitätsstrasse 2, 45141 Essen, Germany.**