

Faculty of Science and Engineering

Profile report: Teaching Tenure-Track Assistant Professor in Mathematics with a focus on Interdisciplinary Mathematics Education

- Discipline: Mathematics; Applied Mathematics
- Level: Tenure-track assistant professor
- Fte: 0,8-1,0 fte

1. Scientific discipline

Mathematics ranges from abstract fundamental science to very concrete applications with a strong societal relevance. Apart from its own continuing research development, it also plays a crucial role in every discipline of science and engineering, and more.

2. Vacancy

This position is opened by the Board of the Faculty (PT/gl/2100066) and will be embedded in the basic unit of the Mathematics Department of the Bernoulli Institute that provides the best fit with the actual research profile of the selected candidate. The criteria and conditions pertaining to the position are described in the document 'Assistant professor with an education profile'.

3. Selection committee (BAC)

Prof. dr. ir. R.W.C.P. Verstappen (Chair), Program director Mathematics/Applied Mathematics and Professor, Computational Science

Prof. dr. J. Top, Department head of Mathematics and Professor, Number Theory & Algebraic Geometry

Prof. dr. N.A. Taatgen, Scientific director Bernoulli Institute and Professor, Cognitive Modeling

Prof. dr. C. Salgado Guimarães da Silva, Assoc. Professor, Arithmetic Geometry

Dr. F. Cnossen, Director of Education Artificial Intelligence/Human-Machine Communication and Associate Professor Cognitive Engineering

Dr. H.P. Lopuhaä, Director of Studies ba/ma Applied Mathematics TU Delft

H.E.H. van der Laan, master's student in Mathematics

4. Area of expertise

Learning mathematics is a critical gateway to many fields of study. Many FSE students have to acquire mathematical skills and knowledge to achieve the learning objectives of their degree programme. Currently, 25 math courses for non-math students are provided by the Mathematics Department of the Bernoulli Institute. This mainly concerns courses in the field of Calculus, Linear Algebra, Statistics and Numerical Mathematics. In FSE mathematics service teaching uses mostly classical methods of knowledge transfer. The primary stages of e-learning and remedial teaching have been introduced successfully and here and there has been

experimented with concepts like flipping the classroom to stimulate active participation of students and to improve their conceptual understanding. The classical approach has been effective in the past, but starts to show cracks. With this position it is intended to innovate the service teaching of mathematics as well as to integrate it more strongly in the degree programme to which the mathematics course is provided, thus improving both the conceptual and contextual understanding of students.

5. Embedding: institute (and base unit)

The Bernoulli Institute (BI) for Mathematics, Computer Science and Artificial Intelligence is part of the Faculty of Science and Engineering (FSE). The Bernoulli Institute is a vibrant community with an international outlook, that fosters talent in all its research areas and disciplines, and is active in pure and applied science, and (multi)disciplinary research and teaching. BI strives at maintaining a balanced mix of fundamental and applied research. It comprises 15 base research units, of which 5 are mathematics oriented. The five mathematics-oriented basic units are: 1. Algebra, 2. Computational & Numerical Mathematics, 3. Dynamical Systems, Geometry & Mathematical Physics, 4. Probability & Statistics, and 5. Systems, Control & Optimization. The position will be embedded in one of these five existing base units of BI, depending on the actual research profile of the selected candidate.

6. Local and (inter)national position

The research groups of the Bernoulli Institute participate in various national research schools and activities, including the NWO clusters DIAMANT, NDNS+, STAR, GQT and the graduate training programme Mastermath. Most of the PhD students are enrolled in an educational program and take part in a number of activities offered in this way. BI has a leading role in the cross-disciplinary research theme on Data Science and Systems Complexity (DSSC), and in the Groningen Cognitive Systems and Materials Center (CogniGron) within FSE. The intended candidate will play a central role in the service education of mathematics, and is expected to cooperate with experts on Science & Engineering Education at FSE (PIE group, for example). Furthermore, cooperation with Teacher Education group within FSE is foreseen. Nationally, Delft University of Technology (TU Delft), for example, has the Programme of Innovation in Mathematics Education (PRIME) for redesigning mathematics courses for engineers. Furthermore, the candidate may contribute to Beta4All by contributing to the Dutch fast-track mathematics teacher training programme for students having a Master's degree in science or engineering. Internationally, many contacts are possible with groups working on innovations in mathematics education (higher education) and in particularly interdisciplinary mathematics education: University of Hamburg, University of Manchester, Stanford University, University of Kassel, e.g.

7. Expected contributions to teaching

The candidate is expected to be a pioneer as well as a catalyst in improving math courses for non-math students at FSE, and can support the staff members of the Bernoulli Institute in improving their education. The candidate is expected to undertake educational projects that improve (interdisciplinary) mathematics education, for instance by improving the activation of students, introducing blended learning techniques, increasing conceptual understanding as well as contextual understanding. The candidate is expected to apply for teaching grants to be able to undertake some of these projects. The teaching duties will include courses like Linear Algebra for Life Science & Technology, Calculus for AI, Mathematics and Statistics for Pharmacy, Numerical Methods for Industrial Engineering & Management.

8. Expected contributions to research

The candidate is expected to extend his/her research program in one of the five existing sub-areas of Mathematics represented in the Bernoulli Institute. The research should lead to publications in top journals. (Co)-supervision of PhD students is an important part of the envisioned research activities, as well as supervision of bachelor's and master's projects. Nationally as well as internationally, he/she should maintain strong connections with other research groups in related areas. Within Groningen, the candidate should keep an open eye for research collaboration with other groups within the Bernoulli Institute and/or in the framework of the FSE research themes Fundamentals of the Universe and Data Science and Systems Complexity, or CogniGron.

9. Expected contributions to the organization

The candidate is expected to have an active interest and to provide a positive contribution to the management and organizational tasks of the institute. At the level of FSE, the candidate will contribute to the organization of the faculty, for example by participating in working groups and committees in the area of education. The candidate will participate in relevant national and international organizations.