

CURRICULUM VITAE

Anna Muranova

February 20, 2025

Personal details

Name: Anna Muranova.

Academic degree: Ph. D.

Date of birth: 15 November 1991.

Place of birth: Vitebsk, Republic of Belarus.

e-mail: anna.muranova@gmail.com

Spoken languages: Russian (mother tongue), English (very good), Polish (C1), German (B2), Spanish (good), French (beginner).

Present mathematical interests: differential operators and random walk on graphs, electrical networks, non-Archimedean fields, algebraic topology on graphs.

Programming languages: Python, R, C, C++, Java, SQL, Pascal.

Other computer skills: SciLab, LaTeX, Wolfram Alpha, Microsoft Word, Excel.



Work experience

- 01.10.2022 – present: assistant professor at the Faculty of Mathematics and Computer Science, University of Warmia and Mazury in Olsztyn (Olsztyn, Poland).
- 25.10.2021 – 30.09.2022: teaching assistant at the Faculty of Mathematics and Computer Science, University of Warmia and Mazury in Olsztyn (Olsztyn, Poland).
- 01.03.2020 – 31.08.2021: postdoc at the Institute of Discrete Mathematics, Graz University of Technology (Graz, Austria).
- 01.10.2016 – 29.02.2020: doctoral student of the International Research Training Group 2235 at the Mathematical Department, Bielefeld University (Bielefeld, Germany).

- 01.08.2016 – 30.08.2016: trainee (programmer) at “Tangram Care” (Bialystok, Poland). In this time I was worked in the direction of computational linguistics.
- 01.10.2012 – 01.06.2013: Laboratory assistant at Research Institute for Applied Problems of Mathematics and Informatics of Belarusian State University (Minsk, Belarus). At this period I participated in a project on investigating genetic sequences (DNA) using probability theory.

Education and degrees

01.10.2016 – 29.02.2020: Doctoral Student of the International Research Training Group 2235 at the Mathematical Department of Bielefeld University (Bielefeld, Germany).

Degree: Ph. D.

01.10.2015 – 30.08.2016 and 31.10.2021 – 07.06.2022: Master student of the Department of Mathematics and Computer Science of University of Warmia and Mazury (Olsztyn, Poland).

Qualification: computer scientist.

Degree: Master of engineering.

01.09.2009 – 30.06.2014: Student of the Mathematical Department of Belarusian State University (Minsk, Belarus).

Graduated with a diploma with honors.

Qualification: mathematician.

Degree: equivalent to Master.

Publications and preprints

Publications:

1. Florian Fischer, Matthias Keller, Anna Muranova and Noema Nicolussi. *Capacity of infinite graphs over non-Archimedean ordered fields*, Accepted to Journal of Mathematical Analysis and Applications, 2024+
2. Anna Muranova. *Dual Cheeger constant for weighted graphs over ordered fields*, in Lecko A., Thomas Derek K. (eds.) *Current Research in Mathematical and Computer Sciences IV*, Wydawnictwo UWM, pp. 81–94 (2023)
3. Anna Muranova. *The effective impedances of infinite ladder networks and Dirichlet problem on graphs*. Bulgarian Journal of Physics. Vol.49, n.2 (2022)
4. Anna Muranova, Wolfgang Woess. *Networks with complex weights: Green function and power series*. Mathematics, 10(5):820 (2022)
5. Anna Muranova. *On the effective impedance of finite and infinite networks*.

Potential Analysis. 56, pages 697–721 (2022)

6. Anna Muranova. *Effective impedance over ordered fields*. Journal of Mathematical Physics. 62, 033502 (2021)
7. Anna Muranova. *On the notion of effective impedance*. Operators and Matrices. Volume 14, Number 3 pp. 723–741 (2020)
8. Anna Muranova. *On dimensions of commutator varieties in case of low-dimensional matrices*. Proceedings of 71th scientific conference of undergraduate and graduate students of Belarusian State University, Minsk, May 18–21, 2014: in 3 parts, Part 1, pp. 18–22. – Minsk : Publishing center of BSU (2014) (In Russian: *О размерностях коммутаторных многообразий в случае матриц малой размерности.*)

Preprints:

1. Yuri Muranov, Anna Muranova *Homology of graph burnings*, <https://arxiv.org/abs/2407.03832>, July, 2024.
2. Matthias Keller, Anna Muranova. *Recurrence and transience for non-Archimedean and directed graphs*, <https://arxiv.org/abs/2406.17344>, June, 2024.
3. Ragon Ebker, Anna Muranova, Max Schmidt. *Power iteration for matrices with power series entries*, arxiv: <https://arxiv.org/abs/2311.06813>, November, 2023.
4. Anna Muranova. *Discrete Laplace and transition operators over non-Archimedean ordered fields*, arXiv: <https://arxiv.org/abs/2207.14018>, July, 2022.
5. Anna Muranova, Robert Schippa. *Eigenvalues of the normalized complex Laplacian on finite electrical networks*, arXiv: <https://arxiv.org/abs/2012.12759>, December 2020.

My Erdős number is 3 (Wolfgang Woess – Carsten Thomassen – Paul Erdős)

Research grants

MINIATURA-6 funded by National Science Center (Poland) for the project “Dirichlet problem for infinite graphs over ordered fields” (November 23, 2022 – November 22, 2023)

Long research stays

- University of Potsdam, August 17 – September 8, 2023 (Potsdam, Germany).
- University of Potsdam, March 1 – March 31, 2023 (Potsdam, Germany).
- Seoul National University, March 2 - August 25, 2018 (Seoul, South Korea).

Short research stays

- University of Münster, June 9 – June 15, 2023 (Münster, Germany).
- University of Potsdam, November 15 – November 18, 2022 (Potsdam, Germany).
- University of Münster, July 11 – July 18, 2022 (Münster, Germany).
- University of Wrocław, May 2 – May 9, 2022 (Wrocław, Poland).
- Karlsruhe Institute of Technology, November 9 – November 20, 2020 (Karlsruhe, Germany).
- Karlsruhe Institute of Technology, July 13 – July 24, 2020 (Karlsruhe, Germany).
- University of Potsdam, November 26 – November 28, 2019 (Potsdam, Germany).
- Graz University of Technology, November 6 – November 9, 2019 (Graz, Austria).
- Friedrich Schiller University in Jena, May 8 – May 10, 2019 (Jena, Germany).

Theses

PhD Thesis: *Scientific advisor:* prof. Alexander Grigor'yan.

Title of the PhD thesis: “On the notion of effective impedance for finite and infinite networks.”

Master thesis in computer science:

Scientific advisor: dr. hab. Piotr Artiemjew, associate professor

Title of the Master thesis: “Application of Kalman filter in modeling of mobile robot control processes.”

Diploma (equiv. to Master) thesis in mathematics:

Scientific advisor: prof. Valerii Vatslavovich Benyash-Krivets.

Title of the Diploma thesis: “Varieties of representations of finitely generated groups.”

Teaching

- UWM in Olsztyn

Exercise classes:

– Winter semester 2024/2025:

Introduction to programming (in Polish), $4 \times 20 + 6 \times 30 = 260$ hours.

Mathematical aspects of Data Analysis (in Polish), 30 hours.

User's programs (in Polish), $2 \times 30 = 60$ hours.

- Summer semester 2024:
Visualization of data in Python (in Polish), $2 \times 45 + 30 = 120$ hours.
- Winter semester 2023/2024:
Data Mining (in Polish), 30 hours.
Introduction to programming (in Polish), $4 \times 20 = 80$ hours.
User's programs (in Polish), 45 hours.
- Summer semester 2023:
Visualization of data in Python (in Polish), $3 \times 45 = 135$ hours.
- Winter semester 2022/2023:
User's programs (in Polish), $2 \times 45 = 90$ hours.
Introduction to programming (in Polish), $6 \times 20 = 120$ hours
- Summer semester 2022:
Visualization of data in Python (in Polish), $2 \times 45 = 90$ hours.
- Winter semester 2021/2022:
User's programs (in Polish), $4 \times 45 + 2 \times 30 = 240$ hours.

Lectures:

- Winter semester 2024/2025:
Introduction to programming (in Polish), 20 hours.
Mathematical aspects of Data Analysis (in Polish), 30 hours.
- Summer semester 2024:
Visualization of data in Python (in Polish), 13 hours.
- Winter semester 2023/2024:
Data Mining (in Polish), 30 hours.
Introduction to programming (in Polish), 20 hours.
- Winter semester 2022/2023:
Introduction to programming (in Polish), 20 hours

- TU Graz

Exercise classes:

- Summer semester 2021:
Mathematics for Electrotechnicians B (in German), $3 \times 30 = 90$ hours.
- Winter semester 2020/2021:
Mathematics for Electrotechnicians A (in German), 15 hours.
- Summer semester 2020:
Probability Theory (in German), 30 hours;
Mathematics for Electrotechnicians B (in German), 15 hours.

Lectures:

- Summer semester 2021:
Mathematics for Electrotechnicians B (in German), 30 hours.
- Bielefeld University
Exercise classes:
 - Winter semester 2019/2020:
Analysis 1 (in German), 15 hours;
Probability Theory for Quantitative Economics (in English), 30 hours.
 - Summer semester 2017:
Number Theory (in German), 30 hours.

Talks and posters

- Poster “Capacity and type of state in non-Archimedean graphs” (Twelfth Bielefeld-SNU joint Workshop in Mathematics, February 17 – 20, 2025, Bielefeld, Germany).
- Talk “Spectrum of a normalized complex Laplacian on finite electrical networks” (VIII International Conference of Mathematics and Computer Science “Congressio-Mathematica”, September 19 – 22, 2024, Olsztyn, Poland).
- Talk “Capacity of graphs over non-Archimedean ordered fields” (Operator Theory and Approximation, July 8 – 12, 2024, Vienna, Austria).
- Talk “Power iteration method for matrices with power series entries” (March 28, 2024, Seminar “Informatyka Stosowana i Modelowanie Matematyczne”, University of Warmia and Mazury in Olsztyn, Poland).
- Talk “Capacity of graphs over non-Archimedean ordered fields” (March 18 – 22, 2024, Analysis on fractals and networks, and applications, CIRM, Marseille, France).
- Talk “On graphs over non-Archimedean ordered fields” (February 5 – 9, 2024, Final Conference of the Action Mathematical Models for Interacting Dynamics on Networks, University of Minho, Braga, Portugal).
- Talk “Markov chains arising from graphs over ordered fields” (December 13, 2023, Seminar Functional Analysis, Operator Theory and Dynamical Systems, Leipzig University, Germany).
- Talk “Discrete Laplacian over a non-Archimedean ordered field” (July 31 – August 4, 2023, IWOTA, Helsinki, Finland).
- Talk “Spectrum of discrete Laplacian over an ordered field” (November 16, 2022, Forschungsseminar Diskrete Spektraltheorie, University of Potsdam, Germany).
- Talk “Spectrum of a normalized complex Laplacian on finite electrical networks” (September 26 – 30, 2022, Conference Aspect’22, Oldenburg, Germany).

- Talk “Spectrum of discrete Laplacian over an ordered field” (VIII International Conference of Mathematics and Computer Science “Congressio-Mathematica”, September 19 – 25, 2022, Olsztyn, Poland).
- Talk “On admittance operator on infinite networks with complex weights” (September 6 – 10, 2022, IWOTA, Cracow, Poland).
- Poster “Laplace and probability operator on graphs over the Levi-Civita field” (August 29 – September 4, 2022, Summer School “Heat Kernels and Spectral Geometry: From Manifolds to Graphs”, Bregenz, Austria).
- Talk “Green kernel and power series on networks” (July 31 – August 6, 2022, 19th Workshop: Noncommutative Probability, Noncommutative Harmonic Analysis and Related Topics with Applications, Będlewo, Poland).
- Talk “Recurrence and transience of generalized networks” (July 13, 2022, Oberseminar Mathematische Stochastik, University of Münster, Germany).
- Talk “Green function on networks” (July 4–8, 2022, Cracow Summer School in Discrete Mathematics, Cracow, Poland).
- Talk “Weighted graphs with edge weights from an ordered field” (May 12, 2022, Seminar “Informatyka Stosowana i Modelowanie Matematyczne”, University of Warmia and Mazury in Olsztyn, Poland).
- Talk “Weighted graphs with edge weights from an ordered field” (May 5, 2022, Discrete harmonic and non-commutative probabilistic analysis seminar, University of Wrocław, Poland).
- Talk “Weighted graphs over ordered fields” (October 20, 2020, Strukturtheorie-Seminar, Graz University of Technology, Austria).
- Talk “On the notion of effective impedance for finite and infinite networks” (December 21, 2019, Geometric Analysis Seminar, Bielefeld University, Germany).
- Talk “On effective impedance of networks”(November 27, 2019, Forschungsseminar Diskrete Spektraltheorie, University of Potsdam, Germany).
- Talk “Effective impedance as a rational function” (November 7, 2019, Strukturtheorie-Seminar, Graz University of Technology, Austria).
- Talk “Effective impedance as a rational function” (September 10 – 13, 2019, Conference “Analytic and algebraic methods in physics XVI”, Prague, Czech Republic).
- Talk “Two approaches to the notion of effective impedance” (May 9, 2019, Oberseminar “Analysis, Geometrie und Stochastik”, University of Jena, Germany)
- Poster “On the notion of effective impedance” (March 25 – 29, 2019, Workshop “Analysis of nonlocal and nonsmooth models”, Bielefeld, Germany).
- Talk “On the notion of effective impedance via ordered fields” (February 25 – March 1, 2019, Conference “Differential Operators on Graphs and Waveguides”, Graz, Austria).
- Poster “Conservation of complex power in electric network” (September 24 – 28,

- 2018, Workshop “Young Women in Mathematical Physics”, Bonn, Germany).
- Talk “Electric networks and complex-weighted graphs” (July 1 – 4, 2018, The 6th Gdańsk Workshop on Graph Theory, Gdańsk, Poland).
 - Poster “Electric networks with impedances” (March 15 – 17, 2018, Sixth Bielefeld - SNU Joint Workshop in Mathematics, Seoul, South Korea).
 - Talk “On effective impedance of electric networks” (December 5, 2017, Geometric Analysis Seminar, Bielefeld University, Germany).
 - Talk “On varieties of representations of finitely generated groups” (May 18 – 21, 2014, 71st scientific conference of undergraduate and graduate students of Belarusian State University, Minsk, Belarus).

Organization of conferences

- X International Conference of Mathematics and Computer Science “Congressio-Mathematica”, September 19 – 22, 2024, Olsztyn, Poland.
- VIII International Conference of Mathematics and Computer Science “Congressio-Mathematica”, September 19 – 25, 2022, Olsztyn, Poland.

Reviews

I have been a reviewer for the following journals:

- *European Journal of Physics*.
- *Physica A: Statistical Mechanics and its Applications*.

Other activities

- I am a member of the Faculty Commission for the Evaluation of the Scientific Discipline of Mathematics at the Faculty of Mathematics and Computer science of the University of Warmia and Mazury in Olsztyn, Poland, 2023 – present
- I am a year tutor for first year students at the Faculty of Mathematics and Computer science of the University of Warmia and Mazury in Olsztyn, Poland, in the academic year 2024/2025.
- I have been a project leader at the 26th Internet Seminar on Evolution equations “Graphs and Discrete Dirichlet Spaces” (Project N: Infinite trees over non-Archimedean ordered fields) in academic year 2022/2023.

Other skills

- I have participated in the Workshop “Request for quotation in English” (April, 2024, Olsztyn, Poland).
- I have participated in the Workshop “Writing, phrases and grammar in formal correspondence in English” (March, 2024, Olsztyn, Poland).
- I have successfully completed the courses “Advanced methods of data analysis and data mining” at the Department of Mathematics and Computer Science of University of Warmia and Mazury (October 1, 2021 – May 31, 2022, Olsztyn, Poland).
- I have participated in the Workshop “Making an impact: Communicating, networking, and presenting” (February, 2019, Norderney, Germany).
- I have participated in the Workshop on Scientific Writing in English (November, 2018, Bielefeld University, Germany).
- I have finished an art school (September, 2003 – July, 2007, Vitebsk, Belarus)
- I have studied one year at the Spanish-speaking secondary school and finished the year with an excellent grade (August, 2007 – July, 2008, Huajuapán de León, Mexico)