Michał Kowalewski

PhD candidate in Mathematics

Faculty of Applied Mathematics
AGH University of Krakow
al. Mickiewicza 30, 30-059 Kraków, Poland
E *kowalewski@agh.edu.pl*
W *michalkowalewski.pl*
ORCID 0009-0006-5834-764X

Research interests

I am interested in topology and discrete dynamical systems, that is, pairs consisting of a space and a map acting on it. I mainly study topological dynamical systems, where the space is a compact metric space and the map is continuous. In particular, I am interested in how the topological properties of a space constrain or enable the types of dynamics it can admit.

Education

2023– **PhD (doktor), Mathematics**, *AGH University of Krakow*, Faculty of Applied Mathematics
Research topic: complex structures in topology and dynamics; expected 2027
Advisor: prof. dr hab. Piotr Oprocha

2021–2023 **MSc (magister), Mathematics**, *AGH University of Krakow*, Faculty of Applied Mathematics
Thesis: *Topological properties of* $\sin(1/x)$*-type continua* (in Polish)
Advisor: prof. dr hab. Piotr Oprocha

2018–2021 **BSc (licencjat), Mathematics**, *AGH University of Krakow*, Faculty of Applied Mathematics
Thesis: *Minimality, equicontinuity and uniform rigidity of topologically transitive dynamical systems* (in Polish)
Advisor: prof. dr hab. Piotr Oprocha

Publications and preprints

published M. Kowalewski, P. Oprocha, *Tranched graphs: consequences for topology and dynamics*, Fund. Math. **273** (2026), no. 1, 1–46. doi:10.4064/fm240613-5-12, arXiv:2405.05407.

published K. Karásová, M. Kowalewski, P. Oprocha, *Every nondegenerate Peano continuum admits a pure mixing selfmap*, Proc. Amer. Math. Soc. **154** (2026), no. 10, 4389–4403. doi:10.1090/proc/17765, arXiv:2511.11271.

submitted M. Foryś-Krawiec, J. Hantáková, M. Kowalewski, P. Oprocha, *Observable dynamics and the generic coincidence of Milnor, statistical, and physical attractors*. arXiv:2511.09718.

Awards and distinctions

2023 **Diamenty AGH** (Diamonds of AGH) — distinction for the best master's theses.

Research visits

All visits below were funded by AGH IDUB grants.

Jun–Sep 2025 Fudan University, Shanghai, China — 3 months

Apr 2025 Charles University, Prague, Czech Republic — 1 week

Jul–Aug 2024 International Centre for Theoretical Physics (ICTP), Trieste, Italy — 5 weeks

Jan 2024 University of Maribor, Slovenia — 2 weeks

Talks and posters

Oct 2026 Poster: *Mixing and exact maps of Peano continua* — 1st Hebei International Conference on Dynamical Systems, Shijiazhuang, China.

Sep 2026 Poster: *Mixing and exact maps of Peano continua* — 2nd ISTA Summer School in Dynamical Systems, Strobl, Austria.

Jul 2026 *Observable dynamics and the generic coincidence of Milnor, statistical and physical attractors* — New Challenges in Celestial Mechanics, CIME, Cetraro, Italy.

Jun 2026 *Mixing and exact maps of Peano continua* — 9th Ostrava–Prague Seminar on Topology and Dynamics, Ostrava, Czech Republic.

Oct 2025 *Dynamics of tranched graph maps* — Special Session on Continuous and Complex Dynamics, AMS Sectional Meeting (online).

Aug 2025 *Tranched graphs: consequences for topology and dynamics* — Topological, Analytic, Algebraic and Geometric Methods in the Dynamics of Differential Equations and Homeomorphisms on Manifolds, SIMIS, Shanghai, China.

Feb 2025 *Connections between tranched graphs and Class W* — 2nd Maribor Mini Workshop on Topological Dynamics, Continuum Theory and Related Topics, Maribor, Slovenia.

Jun 2024 *Graphs with tranches* — 38th Summer Conference on Topology and its Applications, University of Coimbra, Portugal.

Jun 2024 Poster: *Graphs with tranches* — From Topology to Computations in Dynamical Systems, Jagiellonian University, Kraków, Poland.

Jan 2024 *Topological properties of tranched graphs* — 1st Maribor Mini Workshop on Topological Dynamics, Continuum Theory and Related Topics, Maribor, Slovenia.

Oct 2023 *Topological properties of tranched graphs* — Conference on Generic Structures, IMPAN and Institute of Mathematics of the Czech Academy of Sciences, Będlewo, Poland.

Conferences, schools and workshops attended

May 2026 Simons Semester: Continued Fractions, Fractals, Ergodic Theory and Dynamics — IMPAN, Warsaw.

Jan–Feb 2026 Simons Semester: Invariant Structures in Groups, Spaces and Algebras — IMPAN, Warsaw and Będlewo.

Jun 2025 Beyond Uniform Hyperbolicity — ICTP, Trieste, Italy.

Jul–Aug 2024 School and Workshop in Dynamical Systems — ICTP, Trieste, Italy.

Feb 2024 Discrete Mathematics and Computer Science — research school, CIRM, Marseille, France.

Sep 2023 Spanish–Polish Mathematical Meeting — Łódź, Poland.

Mar–May 2023 Simons Semester: Topological, Smooth and Holomorphic Dynamics, Ergodic Theory, Fractals — IMPAN, Warsaw and Będlewo.

2023 Big Ideas in Dynamics — American Institute of Mathematics, online (two editions).

Teaching

2024/25 Problem-solving classes and computer labs at AGH: *Dynamical Systems by Example* (in English) — 10h classes + 20h Python labs, 2 groups; *Topological Dynamics and Chaos* (in Polish) — 30h; *Topology* (in Polish) — 30h.

Academic service

Roles held within the AGH Doctoral Candidates' Council (URSD):

2026– Vice-Chair; representative of doctoral candidates in the AGH Senate, the Senate Committee for Science and the Senate Committee for Statutes and Regulations.

2025 Board member responsible for project logistics.

2024 Chairperson's representative for the PBS meeting.

Languages and skills

Languages Polish (native speaker), English (ACERT C1 certificate)

Computing Python, LaTeX