

Dominik Kwietniak

CONTACT INFORMATION	Assistant Professor (adiunkt) Faculty of Mathematics and Computer Science Jagiellonian University in Kraków ul. Łojasiewicza 6 30-348 Kraków POLAND	<i>E-mail:</i> dominik.kwietniak@uj.edu.pl <i>WWW:</i> Personal Homepage
RESEARCH INTERESTS	Entropy and chaos in dynamical systems. Ergodic theory and its applications to combinatorial number theory. One-dimensional dynamics. Symbolic dynamics. Topology and its applications. Properties of the Web (WWW) graph, PageRank algorithm and its applications. Data mining and time series analysis.	
ACADEMIC APPOINTMENTS	Assistant Professor (adiunkt) Assistant Professor (asystent) Faculty of Mathematics and Computer Science Jagiellonian University in Kraków	February 2009 to present October 2006 to January 2009
DEGREES	Jagiellonian University in Kraków, Poland	
	Ph.D. in Mathematics,	November 2006
	<ul style="list-style-type: none">• Thesis: <i>Devaney chaos and its variants and topological entropy</i> (in Polish)• Advisor: Roman Szrednicki	
	Master of Science in Mathematics with honors,	June 2002
	<ul style="list-style-type: none">• Thesis: <i>Persistence in Dynamical Systems</i> (in Polish)• Advisor: Krzysztof Ciesielski	
EDUCATION	Jagiellonian University in Kraków, Poland	
	Ph.D. Studies in Mathematics,	2002-2006
	Individual interdisciplinary Studies in Mathematics and Natural Sciences	
	<ul style="list-style-type: none">• Mathematics• Computer Science	1997-2002 1997-2001
	V Liceum Ogólnokształcące im. Augusta Witkowskiego w Krakowie	1993-1997
	High school. Special (university) profile: mathematics and physics.	
REFEREED JOURNAL PUBLICATIONS	[1] Dominik Kwietniak, <i>Topological entropy and distributional chaos in hereditary shifts with applications to spacing shifts and beta shifts</i> Discrete and Continuous Dynamical Systems Series A, 33 (2013), no. 6, pp. 2451–2467.	
	[2] Dominik Kwietniak, Martha Ubik <i>Topological entropy of compact subsystems of transitive real line maps</i> Dyn. Sys. 28 (2013), no. 1, pp. 62–75.	
	[3] Marcin Kulczycki, Dominik Kwietniak, <i>Shadowing vs distality for actions of R^n</i> Dyn. Sys. 27 (2012), no. 2, pp. 205–211.	
	[4] Dominik Kwietniak, Piotr Oprocha, <i>On weak mixing, minimality and weak disjointness of all iterates</i> ErgodicTheoryandDynamicalSystems 32 (2012),no. 5, pp. 1661-1672.	

- [5] Dominik Kwietniak, Piotr Oprocha,
A note on the average shadowing property for expansive maps
Topology and its Applications **159** (2012), no. 1, pp. 19–27.
- [6] Grzegorz Harańczyk, Dominik Kwietniak, Piotr Oprocha,
A note on transitivity, sensitivity and chaos for graph maps
J. of Diff. Eq. and Appl. **17** (2011), no. 10, pp. 1549–1553.
- [7] J.L. García Guirao, D. Kwietniak, M. Lampart, P. Oprocha, A. Peris,
Chaos on hyperspaces
Nonlinear Analysis **71** (2009), no. 1-2, pp. 1-8.
- [8] Grzegorz Harańczyk, Dominik Kwietniak,
When lower entropy implies stronger Devaney chaos
Proc. of the AMS **137** (2009), no. 6, pp. 2063-2073.
- [9] Dominik Kwietniak, Piotr Oprocha,
Teoria chaosu w ujęciu matematycznym (Chaos Theory from the Mathematical Viewpoint)
Matematyka Stosowana **9** (2009) pp. 1–45.
- [10] Dominik Kwietniak, Piotr Oprocha,
Topological entropy and chaos for maps induced on hyperspaces
Chaos Solitons Fractals **33** (2007), no. 1, pp. 76-86.
- [11] Dominik Kwietniak, Michał Misiurewicz,
Exact Devaney chaos and entropy
Qualitative Theory of Dynamical Systems **6** (2005), no. 1, pp. 169-179.
- ACCEPTED FOR PUBLICATION [12] Grzegorz Harańczyk, Dominik Kwietniak, Piotr Oprocha,
Topological structure and entropy of mixing graph maps
Ergodic Theory and Dynamical Systems, to appear, arXiv:1111.0566v1 [math.DS]
- SUBMITTED JOURNAL PUBLICATIONS [13] Marcin Kulczycki, Dominik Kwietniak, Piotr Oprocha
On almost specification and average shadowing properties
submitted, 2013.
- EXPOSITORY ARTICLES [14] Dominik Kwietniak, *Szkoły Matematyki Poglądowej zapraszają*
Delta nr **9**, wrzesień (2012).
- [15] Dominik Kwietniak, *Ultrafiltry*
MSN **48** (2012) pp. 32–38.
- [16] Dominik Kwietniak, *Dwa do nieskończoności*
MSN **39** (2008) pp. 21–25.
- [17] Marek Kordos, Dominik Kwietniak, Małgorzata Mikołajczyk, Marcin Preisner, Magdalena Siankowska, *Ćwiczenia ze wstążką*
mm nr 1 (**22**) January 2008.
- PAPERS IN PREPARATION [18] Mikołaj Frączyk, Dominik Kwietniak
On density-difference sets in countable amenable groups
- GRANTS National Science Centre grant Sonata bis
Ergodic theory and its applications in dynamics, arithmetic, and algebra
- PI: Dominik Kwietniak
 - Duration: 2013-2018
 - Research performed at: Jagiellonian University in Kraków
 - Function: principal investigator
- National Science Centre grant Maestro
Invariant measures, entropy and other parameters of growth in classical and non-classical dynamical systems

- PI: Tomasz Downarowicz
- Duration: 2013-2018
- Research performed at: Institute of Mathematics, Polish Academy of Sciences
- Function: investigator, research team member

Polish Ministry of Science and Higher Education grant Iuventus Plus IP 2011 028771

Topological and ergodic properties of generalized spacing shifts and dynamical systems with positive entropy, and/or generalized specification property

- PI: Dominik Kwietniak
- Duration: 2012-2013
- Research performed at: Jagiellonian University in Kraków
- Function: principal investigator

Polish State Committee for Scientific Research (KBN) grant NN 206 2723 33

Distributional chaos, the specification property and the size of chaotic sets

- PI: Piotr Oprocha
- Duration: 2007-2009
- Research performed at: AGH University of Science and Technology, Kraków
- Function: investigator, research team member

Polish State Committee for Scientific Research (KBN) grant NN 201 2700 35

Dynamics of distal pseudogroups and foliations

- PI: Robert Wolak
- Duration: 2008–2010
- Research performed at: Jagiellonian University in Kraków
- Function: investigator, research team member

EU Operational Program Innovative Economy, project R & D for Interia.pl S.A.

Development of the architecture of a new generation mass mail system with scalability flexible enough to be offered worldwide

- PI: Paweł M. Idziak
- Duration: 2008
- Research performed at: Jagiellonian University in Kraków
- Function: investigator, research team member

STUDENT
ADVISING

Mathematical models for epidemic spreading on complex networks

Wojciech Ganczarek Graduated: 2013

- Master of Science in Mathematics
- Thesis: **Mathematical models for epidemic spreading on complex networks**

Kamil Stępień Graduated: 2013

- Master of Science in Mathematics
- Thesis: **Random Graphs**

Kamila Bara Graduated: 2012

- Master of Science in Applied Mathematics
- Thesis: **Frobenius-Perron theorem and its application in PageRank algorithm**

Katarzyna Koziel Graduated: 2012

- Master of Science in Applied Mathematics
- Thesis: **Continuous-time Markov chains and their applications in queuing theory**

Karol Gryszka Graduated: 2011

- Master of Science in Applied Mathematics
- Thesis: **Lagrangian points in the three-body problem**

- Agnieszka Kościelniak** Graduated: 2011
- Master of Science in Financial Mathematics
 - Thesis: **Applying Hidden Markov Models to study crises in financial markets**
- Kamila Gąszcz** Graduated: 2011
- Master of Science in Computational Mathematics
 - Thesis: **The diagnosis of osteoporosis based on the analysis of medical images of the vertebrae**
- Dariusz Czarnecki** Graduated: 2011
- Master of Science in Computational Mathematics
 - Thesis: **The evaluation of mechanical endurance of bones on the basis of tomograms**
- Michał Kotuła** Graduated: 2011
- Master of Science in Mathematics
 - Thesis: **Properties of weak mixing and mixing in G -shifts**
- Michał Jastrzębiec-Bobrowski** Graduated: 2010
- Master of Science in Mathematics
 - Thesis: **Topological entropy of maps with horizontal gaps**
- Paweł Feliks** Graduated: 2010
- Master of Science in Mathematics
 - Thesis: **Transitive dynamical systems**
- Łukasz Wojtala** Graduated: 2010
- Master of Science in Mathematics
 - Thesis: **Interval maps of Sharkovski type 2^∞ and their properties**
- Magdalena Kielek (Nowak)** Graduated: 2010
- Master of Science in Applied Mathematics
 - Thesis: **Geometry of Fractal Limit Sets**
- Piotr Kamiński** Graduated: 2010
- Master of Science in Mathematics
 - Thesis: **Approximation of entropy of circle maps using horseshoes**
- Krystian Jacek** Graduated: 2008
- Master of Science in Applied Mathematics
 - Thesis: **Perron-Frobenius theorem and its application in the PageRank algorithm used by Google search engine**
 - Co-advisor: Jerzy Ombach

TEACHING
EXPERIENCE

Jagiellonian University in Kraków

Lectures

- Applied Linear Algebra WMI.IM-SM/s.a.1
- Ergodic Theory
- Fractals, chaos and dynamical systems WMI.IM-SM/f.c.u.d
- Linear Algebra and Geometry 1&2 WMI.IM-OL/I/alg.2/ek
- Qualitative Theory of Differential Equations WMI.IM-BL/Q.T.D.E
- Time Series Analysis and Forecasting WMI.IM-PPSC-SM.fs

Teaching Assistant (Exercises sessions)

- A transition to higher mathematics
- An introduction to logic & Set Theory
- An introduction to mathematical analysis
- An introduction to probability
- Applied Linear Algebra
- Chaos in Dynamical Systems
- Computer Laboratory
- Differential Equations 1 & 2
- Differential Geometry
- Elementary Geometry
- Ergodic Theory
- Graduate Seminar
- Linear Algebra
- Partial Differential Equations
- Qualitative Theory of Differential Equations
- Smooth Dynamical Systems
- Topology

Other teaching

- Popular lectures on mathematics for high school students (2-6 per year since 2006).
- Mathematical Circle in II Liceum Ogólnokształcące in Kraków (high school), since September 2009.

PROFESSIONAL SERVICE

Referee Service

- *Acta Mathematica Universitatis Comenianae*
- *Annales Polonici Mathematici*
- *Bulletin of the Polish Academy of Sciences Mathematics*
- *Chaos, Solitons & Fractals*
- *Colloquium Mathematicum*
- *Discrete and Continuous Dynamical Systems Series A*
- *Dynamical Systems: An International Journal*
- *Fundamenta Mathematicae*
- *Journal of Difference Equations and Applications*
- *Nihonkai Mathematical Journal*
- *Nonlinear Analysis*
- *Science in China*
- *Topology and its Applications*

Conference Service

- Member of the scientific committee of the 16th International Workshop for Young Mathematicians "Ergodic Theory and Dynamical Systems"
- Organizer/member of the organizing and scientific committee of the Schools of Illustrative Mathematics cycle of conferences:
 - XL Visual Mathematics, Grzegorzewice, winter 2008.
 - XLI Practice and Abstract, Grzegorzewice, summer 2008.
 - XLII Proofs and Counterexamples, Grzegorzewice, winter 2009.
 - XLIII Against Intuition, Grzegorzewice, summer 2009.
 - XLIV But what is it good for? Sulejw, winter 2010.
 - XLV What do I like? Jachranka, summer 2010.
 - XLVI Nonstandard Approach, Warszawa-Miedzeszyn, winter 2011.
 - XLVII Extremes, Nadarzyn, summer 2011.
 - XLVIII Association and Analogy, Otwock, winter 2012.
 - XLIX Exceptions, Nadarzyn, summer 2012.
 - L (In)dependence, Nadarzyn, winter 2013.
 - LI Models, Nadarzyn, summer 2013.

INVITED
CONFERENCE
TALKS

28th Summer Conference on Topology and Its Applications

Nipissing University North Bay, Ontario, Canada July 23-26, 2013

Title: *Chaos and dynamics of dendrite maps*

9th AIMS Conference on Dynamical Systems, Differential Equations and Applications

Orlando, Florida, USA July 1–5, 2012

Title: *On almost specification and average shadowing properties*

16th Czech-Slovak Workshop on Discrete Dynamical Systems

Pustevny, Beskydy mountains, Czech Republic, June 11-15, 2012

Title: *On almost specification and average shadowing properties*

46th Annual Spring Topology and Dynamics Conference

Univerisdad Nacional Autonoma de Mexico (UNAM) Mexico City, D. F., Mexico, March 22–24, 2012

Title: *Topological entropy and distributional chaos in hereditary shifts*

Summer Conference on General Topology and its Applications

The City College of New York, CUNY, Nowy Jork, USA, July 26-29, 2011

Title: *Poincaré recurrence and topological entropy of spacing shifts*

INVITED LECTURES Mini-course: *Specification and shadowing properties*

A week on Dynamical Systems at IM-UFRJ

Rio de Janeiro, Brazil, January 21–25, 2013

TALKS AT
SEMINARS

Arbeitsgemeinschaft: Ergodic Theory and Combinatorial Number Theory

MFO, Oberwolfach, Germany, October 7–13, 2012

Title: *Sumset phenomenon*

Dynamical Systems Seminar at Silesian University in Opava

Opava, Czech Republic, October 30-31, 2012

Title: *Sumset phenomenon part 1 & 2*

Dynamical Systems Seminar at IUPUI

Indianapolis, Indiana, USA, October 17, 2011

Title: *Generalized specification vs. generalized shadowing*

Dynamical Systems Seminar

University of Murcia, Murcia, Spain, May 2010

Title: *Topics in Dynamics of Foliations*

Applied Mathematics Seminar of the Polish Mathematical Society

Kraków, November 2009

Title: *Chaos as a mathematical notion,*

Dynamical Systems Seminar

Polish Academy of Sciences, Warszawa, November 24, 2008

Title: *Topological entropy and specification property for mixing graph maps*

Dynamical Systems Seminar, Matej Bel University, Banská Bystrica, Slovakia,

February 2008

Title: *Chaos for mixing graph maps*

Dynamical Systems Seminar

Warsaw University, Warszawa, November 17, 2006

Title: *Devaney chaos and its variants and topological entropy*

Ergodic Theory Seminar

Wrocław University of Technology, Wrocław, January 5, 2006

Title: *Chaos w sensie Devaneya i jego odmiany a entropia topologiczna*

OTHER
CONFERENCE
TALKS

- When the simplex of invariant measures is Poulsen?*
Thermodynamic Formalism and Applications, PUC, Santiago, Chile 2013.
- Exact Devaney chaos and topological entropy*
9th Czech-Slovak Workshop On Discrete Dynamical Systems, Malenovice 2005.
- Topological entropy of totally chaotic one-dimensional maps*
10th Czech-Slovak Workshop On Discrete Dynamical Systems, Praded 2006.
- On the topological entropy of mixing circle maps*
11th Czech-Slovak Workshop on Discrete Dynamical Systems, Štřebnskie Pleso 2007.
- When lower entropy implies stronger Devaney chaos*
First Joint International Meeting AMS-PTM, Warszawa 2007.
- A simple map inducing complicated dynamics*
International Conference on Dynamical Systems in honour of Michał Misiurewicz on his 60th birthday, Będlewo 2008.
- Specification property and entropy for mixing graph maps*
12th Czech-Slovak Workshop on Discrete Dynamical Systems, Pustevny 2008.
- Intermediate entropy over subsystems*
The Visegrad conference Dynamical Systems, Jeseníky 2009.
- On transitivity, sensitivity and chaos for maps of graphs and some other spaces*
25th Summer Conference on Topology and its Applications, Kielce, Poland, 2010.
- On applications of spacing shifts*
Czech-Slovak-Spanish Workshop on Discrete Dynamical Systems, La Manga del Mar Menor, Spain, 2010.
- Dynamics of spacing shifts*
Low-dimensional dynamics, IM PAN Warszawa 2010.
- Properties of systems with the generalized shadowing or specification property*
Ergodic Methods in Dynamics, Będlewo, Poland, April 23–27, 2012.

PROFESSIONAL
MEMBERSHIPS

- Polish Mathematical Society
- American Mathematical Society
- Mathematical Association of America
- Stowarzyszenie na rzecz Edukacji Matematycznej (Society for Mathematical Education)

RESEARCH VISITS

- Universidade Federal do Rio de Janeiro, Brasil, January 2013
- Matej Bej University of Banská Bystrica, Slovakia, November 2012
- Silesian University in Opava, Czech Republic, October 2012
- Matej Bej University of Banská Bystrica, Slovakia, February 2008
- University of Murcia, Spain, May 2010

SOFTWARE SKILLS Computer Programming:

- C, C++, Python (good) SQL, MySQL (basic)

Mathematical and statistical software:

- Mathematica, Maple, R (good), Statistica (basic)

Typography:

- T_EX (L^AT_EX, B_IB_TE_X, P_STricks) (good)

Operating Systems:

- Microsoft Windows family (good), Linux (Unix family) (basic)

AWARDS

- Michał Jakub Łysek Memorial Award for the best young mathematician at the Jagiellonian University (Krakw, 2006).
- Award at the Competition for Conference Grants of the Polish Science Foundation (1st edition for the year 2011) (Warsaw, 2011).
- Polish Minister of National Education Scholarship for Outstanding Students for the year 2001/02.
- Medal of the Commission of National Education (*Medal Komisji Edukacji Narodowej*) for contributions to mathematical education awarded in 2011.
- Jagiellonian University in Kraków Rector's Team Award for 2009, 2010, 2011 and 2012.

REFERENCES

Prof. Michał Misiurewicz (e-mail: mmisiure@math.iupui.edu)

- Professor, Department of Mathematical Sciences, IUPUI

Prof. Tomasz Downarowicz (e-mail: Tomasz.Downarowicz@pwr.wroc.pl)

- Professor, Institute of Mathematics and Computer Science, Wrocław University of Technology

Prof. Roman Srzednicki (e-mail: Roman.Srzednicki@im.uj.edu.pl)

- Professor, Faculty of Mathematics and Computer Science, Jagiellonian University in Kraków